NAVFAC ATLANTIC

WORK ORDER NO. 1382137
1382138

CONTRACT NO. N40080-17-R-0002

VOLUME I

FY16 SP Repair Runway 14-32 and 6-24 Phase 2 and 3

At the

Naval Air Station, Patuxent River,MD

Final Submission

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A/E Contract: N62470-12-D-2010 W.O. 0004

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Specifications:

For Commander, NAVFAC:
Date:

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61	CG102	13080119	GRADING AND DRAINAGE PLAN - STA 239+21 - 250+41
62	CG103	13080120	GRADING AND DRAINAGE PLAN - STA 250+41 - 261+61
63	CG104	13080121	GRADING AND DRAINAGE PLAN - STA 261+61 - 272+81
64	CG105	13080122	GRADING AND DRAINAGE PLAN - STA 284+01 - 295+21
65	CG106	13080123	GRADING AND DRAINAGE PLAN - STA 295+21 - 306+41
66	CG107	13080124	GRADING AND DRAINAGE PLAN - STA 306+41 - 317+61
67	CG108	13080125	GRADING AND DRAINAGE PLAN - STA 317+61 - 328+81
68	CG109	13080126	GRADING AND DRAINAGE PLAN - STA 328+81 - 340+01
69	CG110	13080127	GRADING AND DRAINAGE PLAN - STA 340+01 - 351+21
70	CG111	13080128	GRADING AND DRAINAGE PLAN - EMP
71	CG112	13080129	GRADING AND DRAINAGE PLAN - COMPASS ROSE
72	CG201	13080130	RUNWAY 6-24 CENTERLINE PROFILE
73	CG202	13080131	RUNWAY 6-24 CENTERLINE PROFILE
74	CG203	13080132	RUNWAY 6-24 CENTERLINE PROFILE
75	CG204	13080133	RUNWAY 6-24 CENTERLINE PROFILE
76	CG205	13080134	EMP TOWWAY CENTERLINE PROFILE
77	CG301	13080135	RUNWAY 6-24 CROSS SECTIONS - STA 235+50 - 239+00
78	CG302	13080136	RUNWAY 6-24 CROSS SECTIONS - STA 239+50 - 243+00
79	CG303	13080137	RUNWAY 6-24 CROSS SECTIONS - STA 243+50 - 247+00
80	CG304	13080138	RUNWAY 6-24 CROSS SECTIONS - STA 247+50 - 251+00
81	CG305	13080139	RUNWAY 6-24 CROSS SECTIONS - STA 251+50 - 255+00
82	CG306	13080140	RUNWAY 6-24 CROSS SECTIONS - STA 255+50 - 259+00
83	CG307	13080141	RUNWAY 6-24 CROSS SECTIONS - STA 259+50 - 263+00
84	CG308	13080142	RUNWAY 6-24 CROSS SECTIONS - STA 263+50 - 267+00
85	CG309	13080143	RUNWAY 6-24 CROSS SECTIONS - STA 267+50 - 271+00
86	CG310	13080144	RUNWAY 6-24 CROSS SECTIONS - STA 271+50 - 272+00
87	CG311	13080145	RUNWAY 6-24 CROSS SECTIONS - STA 283+50 - 287+00
88	CG312	13080146	RUNWAY 6-24 CROSS SECTIONS - STA 287+50 - 291+00
89	CG313	13080147	RUNWAY 6-24 CROSS SECTIONS - STA 291+50 - 295+00
90	CG314	13080148	RUNWAY 6-24 CROSS SECTIONS - STA 295+50 - 299+00
91	CG315	13080149	RUNWAY 6-24 CROSS SECTIONS - STA 299+50 - 303+00
92	CG316	13080150	RUNWAY 6-24 CROSS SECTIONS - STA 303+50 - 307+00
93	CG317	13080151	RUNWAY 6-24 CROSS SECTIONS - STA 307+50 - 311+00
94	CG318	13080152	RUNWAY 6-24 CROSS SECTIONS - STA 311+50 - 315+00
95	CG319	13080153	RUNWAY 6-24 CROSS SECTIONS - STA 315+50 - 319+00
96	CG320	13080154	RUNWAY 6-24 CROSS SECTIONS - STA 319+50 - 323+00

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SHEET NO.		**NAVFAC DWG. NO.**	**SHEET TITLE**
97	CG321	13080155	RUNWAY 6-24 CROSS SECTIONS - STA 323+50 - 327+00
98	CG322	13080156	RUNWAY 6-24 CROSS SECTIONS - STA 327+50 - 331+00
99	CG323	13080157	RUNWAY 6-24 CROSS SECTIONS - STA 331+50 - 335+00
100	CG324	13080158	RUNWAY 6-24 CROSS SECTIONS - STA 335+50 - 339+00
101	CG325	13080159	RUNWAY 6-24 CROSS SECTIONS - STA 339+50 - 343+00
102	CG326	13080160	RUNWAY 6-24 CROSS SECTIONS - STA 343+50 - 347+00
103	CG327	13080161	RUNWAY 6-24 CROSS SECTIONS - STA 347+50 - 349+50
104	CG328	13080162	EMP TOWWAY CROSS SECTIONS - STA 0+00 - 3+50
105	CG329	13080163	EMP TOWWAY CROSS SECTIONS - STA 4+00 - 8+00
106	CG330	13080164	EMP TOWWAY CROSS SECTIONS - STA 9+50 - 13+00
107	CG331	13080165	EMP TOWWAY CROSS SECTIONS - STA 13+50 - 19+00
108	CG332	13080166	EMP TOWWAY CROSS SECTIONS - STA 19+50 - 19+80
109	CG333	13080167	COMPASS ROSE CROSS SECTIONS
110	C-141	13080168	AIRFIELD MARKING AND STRIPING PLAN
111	C-142	13080169	AIRFIELD MARKING AND STRIPING PLAN
112	C-143	13080170	AIRFIELD MARKING AND STRIPING PLAN
113	C-144	13080171	AIRFIELD MARKING AND STRIPING PLAN
114	C-145	13080172	AIRFIELD MARKING AND STRIPING PLAN
115	C-146	13080173	AIRFIELD MARKING AND STRIPING PLAN
116	C-147	13080174	AIRFIELD MARKING AND STRIPING PLAN
117	C-148	13080175	AIRFIELD MARKING AND STRIPING PLAN
118	C-149	13080176	AIRFIELD MARKING AND STRIPING PLAN
119	C-150	13080177	AIRFIELD MARKING AND STRIPING PLAN
120	C-151	13080178	AIRFIELD MARKING AND STRIPING PLAN
121	C-152	13080179	AIRFIELD MARKING AND STRIPING PLAN
122	C-401	13080180	CONCRETE REPAIR PLAN - STA 229+14 - 234+74
123	C-402	13080181	CONCRETE REPAIR PLAN - STA 234+74 - 240+34
124	C-403	13080182	CONCRETE REPAIR PLAN - STA 240+34 - 245+94
125	C-404	13080183	CONCRETE REPAIR PLAN - STA 334+41 - 340+01
126	C-405	13080184	CONCRETE REPAIR PLAN - STA 340+01 - 345+61
127	C-406	13080185	CONCRETE REPAIR PLAN - STA 345+61 - 351+21
128	C-407	13080186	CONCRETE REPAIR PLAN - TAXIWAY A WEST
129	C-408	13080187	CONCRETE REPAIR PLAN - TAXIWAY A EAST
130	C-409	13080188	CONCRETE JOINT PLAN - EMP SITE
131	C-410	13080189	CONCRETE JOINT PLAN - COMPASS ROSE
132	C-501	13080190	EXISTING PAVEMENT SECTIONS - SHEET 1
133	C-502	13080191	EXISTING PAVEMENT SECTIONS - SHEET 1
134	C-503	13080192	TYPICAL PAVEMENT SECTIONS - SHEET 1
135	C-504	13080193	TYPICAL PAVEMENT SECTIONS - SHEET 2
136	C-505	13080194	TYPICAL PAVEMENT SECTIONS - SHEET 3
137	C-511	13080195	CONSTRUCTION DETAILS
138	C-512	13080196	CONSTRUCTION DETAILS
139	C-513	13080197	CONSTRUCTION DETAILS
140	C-514	13080198	CONSTRUCTION DETAILS
141	C-515	13080199	CONSTRUCTION DETAILS
142	C-517	13080200	DRAINAGE DETAILS
143	C-518	13080201	DRAINAGE DETAILS
144	C-521	13080202	ARRESTING GEAR PAVEMENT PROTECTION SYSTEM DETAILS
145	C-522	13080203	ARRESTING GEAR PAVEMENT PROTECTION SYSTEM DETAILS
146	C-531	13080204	PAVEMENT MARKING DETAILS

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147	C-532	13080205	PAVEMENT MARKING DETAILS
148	C-533	13080206	PAVEMENT MARKING DETAILS
149	C-551	13080207	EROSION AND SEDIMENT CONTROL NOTES
150	C-552	13080208	EROSION AND SEDIMENT CONTROL NOTES
151	C-553	13080209	EROSION AND SEDIMENT CONTROL STABILIZATION NOTES
152	C-554	13080210	EROSION AND SEDIMENT CONTROL STABILIZATION NOTES
153	C-555	13080211	EROSION AND SEDIMENT CONTROL DETAILS
154	C-556	13080212	EROSION AND SEDIMENT CONTROL DETAILS
155	C-557	13080213	EROSION AND SEDIMENT CONTROL DETAILS
156	C-558	13080214	EROSION AND SEDIMENT CONTROL DETAILS
157	C-559	13080215	EROSION AND SEDIMENT CONTROL DETAILS
158	C-560	13080216	EROSION AND SEDIMENT CONTROL DETAILS
159	C-561	13080217	EROSION AND SEDIMENT CONTROL DETAILS
160	C-562	13080218	EROSION AND SEDIMENT CONTROL DETAILS
ELECTRICAL			
161	ED100	13080219	OVERALL SITE PLAN - DEMOLITION
162	ED101	13080220	PARTIAL SITE PLAN - DEMOLITION
163	ED102	13080221	PARTIAL SITE PLAN - DEMOLITION
164	ED103	13080222	PARTIAL SITE PLAN - DEMOLITION
165	ED104	13080223	PARTIAL SITE PLAN - DEMOLITION
166	ED105	13080224	PARTIAL SITE PLAN - DEMOLITION
167	ED106	13080225	PARTIAL SITE PLAN - DEMOLITION
168	ED107	13080226	PARTIAL SITE PLAN - DEMOLITION
169	ED108	13080227	PARTIAL SITE PLAN - DEMOLITION
170	ED109	13080228	PARTIAL SITE PLAN - DEMOLITION
171	ED110	13080229	PARTIAL SITE PLAN - DEMOLITION
172	ED111	13080230	PARTIAL SITE PLAN - DEMOLITION
173	ED112	13080231	PARTIAL SITE PLAN - DEMOLITION
174	ED113	13080232	PARTIAL SITE PLAN - DEMOLITION
175	ED114	13080233	PARTIAL SITE PLAN - DEMOLITION
176	ED115	13080234	PARTIAL SITE PLAN - DEMOLITION
177	ED116	13080235	PARTIAL SITE PLAN - DEMOLITION
178	ED117	13080236	PARTIAL SITE PLAN - DEMOLITION
179	ED901	13080237	ELECTRICAL PHOTOS
180	EA001	13080238	ELECTRICAL GENERAL NOTES
181	EA002	13080239	ELECTRICAL CONSTRUCTION LEGEND AND ABBREVIATIONS
182	EA100	13080240	OVERALL SITE PLAN - CONSTRUCTION
183	EA101	13080241	PARTIAL SITE PLAN - CONSTRUCTION
184	EA102	13080242	PARTIAL SITE PLAN - CONSTRUCTION
185	EA103	13080243	PARTIAL SITE PLAN - CONSTRUCTION
186	EA104	13080244	PARTIAL SITE PLAN - CONSTRUCTION
187	EA105	13080245	PARTIAL SITE PLAN - CONSTRUCTION
188	EA106	13080246	PARTIAL SITE PLAN - CONSTRUCTION
189	EA107	13080247	PARTIAL SITE PLAN - CONSTRUCTION
190	EA108	13080248	PARTIAL SITE PLAN - CONSTRUCTION
191	EA109	13080249	PARTIAL SITE PLAN - CONSTRUCTION
192	EA110	13080250	PARTIAL SITE PLAN - CONSTRUCTION
193	EA111	13080251	PARTIAL SITE PLAN - CONSTRUCTION
194	EA112	13080252	PARTIAL SITE PLAN - CONSTRUCTION
195	EA113	13080253	PARTIAL SITE PLAN - CONSTRUCTION

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SHEET NO.		**NAVFAC DWG. NO.**	**SHEET TITLE**
196	EA114	13080254	PARTIAL SITE PLAN - CONSTRUCTION
197	EA115	13080255	PARTIAL SITE PLAN - CONSTRUCTION
198	EA116	13080256	PARTIAL SITE PLAN - CONSTRUCTION
199	EA117	13080257	PARTIAL SITE PLAN - CONSTRUCTION
200	EA501	13080258	ELECTRICAL DETAILS
201	EA502	13091634	ELECTRICAL DETAILS
202	EA503	13091635	ELECTRICAL DETAILS
203	EA504	13091636	ELECTRICAL DETAILS
204	EA601	13091637	AIRFIELD LIGHTING TABLES
205	EA602	13091638	AIRFIELD LIGHTING TABLES
206	EA603	13091639	AIRFIELD LIGHTING TABLES

SECTION 01 11 00

SUMMARY OF WORK
08/11

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Description

The work includes the following generally described items. The detail work is shown on the Contract Drawings entitled "FY16 Special Project RM12-2137 Repair Runways 14-32 & 6-24 - Phase 2", "FY16 Special Project RM12-2137 Repair Runways 14-32 & 6-24 - Phase 3" and these specifications and incidental related work.

1.1.1.1 RM12-2137 Phase 2

Airfield Pavement Repairs

a. Airfield pavement repairs include pavement removal and replacement to support installation of electrical ductbanks.

Airfield Lighting Repairs

The electrical airfield lighting consisting of the Runway 6 ALSF-1 Approach lighting, Runway 6 Wave-off lighting, Optical Landing System (OLS) power and control, eight windcones throughout the airfield, and circuiting will be demolished. The lighting upgrades will include new foundations, light base cans, conduit and wire.

b. The four OLS sites will be powered from new utility transformers at Runways 6, 14 and 32. The existing utility transformer at the Runway 24 OLS site will remain and be re-used.

c. A new ductbank system with handholes and manholes to accommodate new and future circuiting will be constructed between the lighting vaults and runway 6-24 future lighting replacement.

d. Sections of the existing duct bank and handholes, conduit and wire from Vault 1710 will be demolished along with all four existing OLS site power and control infrastructure.

e. The windcone circuit wiring will be replaced where required.

f. This project includes replacement of the existing SPAWAR system with new ALCMS components. Construction of duct banks for required connectivity between the tower, vaults and all airfield components is required. Coordination with the proprietary SPAWAR contractor is required. Coordination shall be through the Contracting Officer. Actual SPAWAR ALCMS components and fiber optic interconnections shall be by SPAWAR contractor. The contractor must however coordinate with the SPAWAR contractor through the Contracting Officer in order to meet the project construction schedule.

Building Repairs

a. Building repairs include demolition of existing main lighting vault structure 1710 and existing ALS vault structures 155 and 1932. Proper handling and disposal of hazardous materials is required. Construction of new Main Lighting vault and ALS vault are required including emergency standby power. Site improvements include all excavation, proper disposal of surplus material offsite, grading, pavement, fencing and permanent ground cover.

b. Included are all exterior and interior building modifications required to install necessary conductors from exterior buctbanks outside of ATC tower up to ALCMS equipment in the tower cab. The contractor shall meet with the Contracting Officer and/or his authorized representitive and determine the routing for installation of conduits needed for conductors for connecting new equipment in the tower cab. All surfaces shall be patched to match existing or better.

1.1.1.2 RM12-2137 Phase 3

Airfield Pavement Repairs

a. This project will repair Runway 6-24 asphalt and concrete pavement, including runway access points at NAS Patuxent River. The rehabilitation scope will include rehabilitation by mill-and-overlay, areas of demolition and reconstruction, and local repairs of existing concrete pavement.

b. The project includes the rehabilitation of approximately 2,934,000 SF of asphalt runway, taxiway, and shoulder pavement through a mill-and-overlay operation.

c. Full-depth concrete pavement reconstruction is required for the EMP area and the Compass Rose calibration pad at Taxiway D. The Compass Rose work requires the contractor to hire a Maryland registered professional land surveyor to perform magnetic survey adhering to the procedures for Magnetic Field Survey and Magnetic Direction Survey (for new pads) found in Appendix B, Section 10 of UFC 3-260-01.

d. Additional concrete pavements including the Runway ends 6, 20 and 24, shall receive various concrete pavement repairs (full-depth, partial-depth, sealing, etc.).

e. The two arresting gear (A/G) systems located on Runway 6-24 will be reconstructed.

f. Runway intersection pavement work will take place at the Runway 6 end during this project. Timely completion of the Runway 6 end work is critical, as Runway 2-20 is needed for operations while Runway 6-24 is closed, and because Taxiway A is needed for airfield circulation in this corner of the airfield.

g. Grading and drainage repair of failed structures within close proximity of Runway 6-24 is required for this project. Grading operations within the unpaved runway and taxiway shoulders is required as shown to accommodate the ongoing asphalt paving operations.

Airfield Lighting Repairs

a. The electrical airfield lighting for runway 6-24 consisting of edge

lights, threshold lights, centerline lights, distance remaining and arresting gear markers. The runway edge, centerline and threshold lights will be replaced with incandescent based light fixtures. The lighting upgrades will include new foundations, light base cans, conduit and wire.

b. The EMP site consists of static grounding receptacles which will be removed with the pavement and replaced.

1.1.2 Location

The work shall be located at the NAS Patuxent River, approximately as indicated. The exact location will be shown by the Contracting Officer.

1.2 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.

1.2.1 Independent Verification

1.3 OCCUPANCY OF PREMISES

Building(s) 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, corridors, and stairways.

1.4 LOCATION OF UNDERGROUND UTILITIES

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

1.5 Navy and Marine Corps (NMCI) Coordination Requirements

1.5.1 NMCI Contractor Access

The NMCI Contractor must be allowed access to the facility towards the end of construction (finishes 90 percent complete, rough-in 100 percent complete, Inside Plant (ISP)/Outside Plant (OSP) infrastructure in place) to provide equipment in the telecommunications rooms and make final connections. Coordinate efforts with the NMCI contractor to facilitate joint use of building spaces during the final phases of construction. After the Contracting Officer has facilitated coordination meetings between the two contractors, the construction contractor must, within one week, incorporate the effort of additional contractor coordination into construction schedule to demonstrate plan for maintaining the contract duration.

1.6 SALVAGE MATERIAL AND EQUIPMENT

Items designated on the Plans or by the Contracting Officer to be salvaged shall remain the property of the Government. Items shown to be reinstalled shall be reinstalled per the requirements of the Plans and Specifications.

The salvaged property shall be segregated, itemized, delivered, and off-loaded at a Government designated storage area located within 2 miles of the construction site.

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

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 14 00

WORK RESTRICTIONS
11/11

PART 1 GENERAL

1.1 SPECIAL SCHEDULING REQUIREMENTS

a. A completed Phase must be ready for operation as approved by Contracting Officer before work is started on a subsequent Phase which would interfere with normal operation. See project phasing requirements contained in the Contract Drawings.

b. Have materials, equipment, and personnel required to perform the work at the site prior to the commencement of the work. Specific items of work to which this requirement applies include:

(1) Provide manpower and equipment necessary to perform a phase switch as indicated in an overnight work shift. The phase switch shall include, at a minimum, striping, striping removal, barrier placement, signage modifications, and temporary circuiting.

(2) Manpower, materials and equipment necessary to complete Runway-Runway intersection paving in single off-peak work shifts as indicated.

c. The NAS Pax River Airfield will remain in operation during the entire construction period. The Contractor must conduct his operations so as to cause the least possible interference with normal operations of the activity.

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

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

The following conditions apply but are not a complete list:

(1) Navaid continuous operation.

(2) Access adjacent to runways.

f. Construction phasing is designated on the Drawings. Phases requiring closure of the Runway-Runway intersection shall be performed in such a way that Runway 14-32 is returned to service within the required duration

g. Standby equipment is required at all times for dust control, sweeping, milling, and paving operations. Standby equipment shall be on-site and operational. Equipment shall include, but not be limited to, sweepers, vacuum trucks, water trucks, tack trucks, rollers, milling machines, and pavers.

1.2 CONTRACTOR ACCESS AND USE OF PREMISES

1.2.1 Activity Regulations

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. Mark Contractor equipment for identification.

1.2.1.1 Identification Badges and Installation Access

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 Base Pass and Identification Office. Costs for obtaining passes through the NCACS are the responsibility of the Contractor. One-day passes, issued through the Base 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) . Immediately report instances of lost or stolen badges to the Contracting Officer.

a. 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 Base 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 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.

b. 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.

1.2.1.2 Additional Badge Requirements - NAS Patuxent River

Identification badges will be issued to the Contractor and his employees in accordance with the Naval Air Station Security Regulations. A copy of the

security regulations may be obtained from the security office. All badges must be returned or accounted for to the department of Public Safety's Pass and Identification Office upon expiration of the badge or contract, or termination of the employee.

1.2.1.3 Employee List

The Contractor must provide to the Contracting officer, in writing, the names of two designated representatives authorized to request personnel and vehicle passes for employees and subcontractor's employees prior to commencement of work under this contract. The Contractor must adhere to the requirements of "Important Clarifications - Contractors - How to Gain Access," dated 31 October 1995, in obtaining access to the Naval Air Station complex for the life of the contract. A copy of these requirements will be provided at the preconstruction meeting.

1.2.1.4 Personnel Entry Approval

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

1.2.1.5 No Smoking Policy

Smoking is prohibited within and outside of all buildings on installation, except in designated smoking areas. This applies to existing buildings, buildings under construction and buildings under renovation. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines. The Contracting Officer will identify designated smoking areas.

1.2.2 Working Hours

Regular working hours must consist of an 8 1/2 hour period , between 7 a.m. and 3:30 p.m., Monday through Friday, excluding Government holidays.

1.2.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work must be lighted in a manner approved by the Contracting Officer. Make utility cutovers after normal working hours or on Saturdays, Sundays, and Government holidays unless directed otherwise.

1.2.4 Occupied and Existing Buildings

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

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

Provide dust covers or protective enclosures to protect existing work that remains and Government material located in the ATCT during the construction

period.

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

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

1.2.5 Utility Cutovers and Interruptions

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

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

c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, and airfield lighting are considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours."

1.3 SECURITY REQUIREMENTS

1.3.1 Naval Air Station (NAS), Patuxent River, MD

Foreign Nationals: The Contractor is responsible for notifying the Contracting Officer, at least five days in advance, of any foreign nationals coming into a restricted area so that proper clearance and escort procedures may be initiated.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 20 00.00 20

PRICE AND PAYMENT PROCEDURES
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.

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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. 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

1.3.1 Data Required

This contract requires the use of a cost-loaded Network Analysis Schedule (NAS). The information required for the Schedule of Prices will be entered as an integral part of the Network Analysis Schedule. 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. 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.

1.4 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.

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 certification required by DFARS 252.247.7023 TRANSPORTATION OF SUPPLIES BY SEA, and 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 and required certification of Transportation of Supplies by Sea must be provided directly to the respective Contracting Officer prior to submission of the final invoice. Once receipt of the original Final Release Form and required certification of Transportation of Supplies by Sea has been confirmed by the Contracting Officer, the Contractor shall then submit final invoice and attach a copy of the Final Release Form and required certification of Transportation of Supplies by Sea in WAWF.

c. Final invoices not accompanied by the Contractor's Final Release and required certification of Transportation of Supplies by Sea 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/prestressed 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.

f. Materials to be considered for progress payments prior to installation shall be stored either in Hawaii, Guam, Puerto Rico, or the Continental United States. Other locations are subject to written approval by the Contracting Officer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS
08/15

PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) 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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

View Location Map; G

Progress and Completion Pictures; G

1.3 VIEW LOCATION MAP

Submit, prior to or with the first digital photograph submittals, a sketch or drawing indicating the required photographic locations. Update as required if the locations are moved.

1.4 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, digital photographs, 1600x1200x24 bit true color minimum resolution in JPEG file format 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 with the monthly invoice two sets of digital photographs, each set on a separate compact disc (CD) or data versatile disc (DVD), cumulative of all photos to date. Indicate photographs demonstrating environmental procedures. Provide photographs for each month in a separate monthly directory and name each file to indicate its location on the view location sketch. Also provide the view location sketch on the CD or DVD as a digital file. Include a date designator in file names. Cross reference submittals in the appropriate daily report. Photographs provided are for unrestricted use by the Government.

1.5 MINIMUM INSURANCE REQUIREMENTS

Provide the minimum insurance coverage required by FAR 28.307-2 LIABILITY, during the entire period of performance under this contract.

1.6 FIRST TIER CONTRACTOR REQUIREMENTS FOR ASBESTOS CONTAINING MATERIALS

Accomplish all contract requirements of Section 02 82 16.00 20 ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS, assigned to the Private Qualified Person, directly with a first tier subcontractor.

1.7 SUPERVISION

1.7.1 Minimum Communication Requirements

Have at least one qualified superintendent, or competent alternate, capable of reading, writing, and conversing fluently in the English language, on the job-site at all times during the performance of contract work. In addition, if a Quality Control (QC) representative is required on the contract, then that individual must also have fluent English communication skills.

1.7.2 Superintendent Qualifications

The project superintendent must have a minimum of 10 years experience in construction with at least 5 of those years as a superintendent on projects similar in size and complexity. The individual must be familiar with the requirements of EM 385-1-1 and have experience in the areas of hazard identification and safety compliance. The individual must be capable of interpreting a critical path schedule and construction drawings. The qualification requirements for the alternate superintendent are the same as for the project superintendent. The Contracting Officer may request proof of the superintendent's qualifications at any point in the project if the performance of the superintendent is in question.

1.7.2.1 Duties

The project superintendent is primarily responsible for managing and coordinating day-to-day production and schedule adherence on the project. The superintendent is required to attend NAVFAC Red Zone meetings, partnering meetings, and quality control meetings. The superintendent or qualified alternative must be on-site at all times during the performance of this contract until the work is completed and accepted.

1.7.3 Non-Compliance Actions

The Project Superintendent is 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 is acceptable as the subject of claim for extension of time for excess costs or damages by the Contractor.

1.8 PRECONSTRUCTION MEETING

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 or earned value report, 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 must also attend.

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

Meet with the Government 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 with a discussion of the NAVFAC Red Zone (NRZ) process and convene at regularly scheduled NRZ Meetings. Include the following in the facility Turnover effort:

1.9.1 NRZ Checklist

a. Contracting Officer's Technical Representative (COTR) will provide the Contractor a copy of the NRZ Checklist template prior to 75 percent completion.

b. Prior to 75 percent completion add/delete critical activities to the NRZ Checklist template as necessary to match the project scope, and schedule critical activities and insert planned completion dates in the NRZ checklist for each critical activity. Present the NRZ Checklist to COTR and review during a regularly scheduled QC Meeting.

1.9.2 Meetings

a. Upon Government acceptance of the NRZ Checklist, the Project Superintendent is required to lead regular NRZ Meetings beginning at approximately 75 percent project completion, or three to six months prior to Beneficial Occupancy Date (BOD), whichever comes first.

b. The Contracting Officer will determine the frequency of the meetings, which is expected to increase as the project completion draws nearer.

c. Using the NRZ Checklist as a Plan of Action and Milestones (POAM) and basis for discussion, review upcoming critical activities and strategies to ensure work is completed on time.

d. Coordinate with the COTR any upcoming activities that require Government involvement.

e. Maintain the NRZ Checklist by documenting the actual completion dates as work is completed and update the NRZ Checklist with revised planned completion dates as necessary to match progress. Distribute copies of the current NRZ Checklist to attendees at each NRZ Meeting.

1.10 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), the Government Design and Construction team and Subject Matter Experts, the 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.

1.10.1 Formal Partnering

Provide and host the Partnering sessions with key personnel of the Project Team, including Contractor personnel and Government personnel. Pay all costs associated with the Partnering effort including the Facilitator, the meeting room, and other incidental items. In exception, each participant bears their own costs for meals, lodging, and transportation associated with the Partnering sessions.

Before a Partnering session, coordinate with the Facilitator all requirements for incidental items (such as audio-visual equipment, easels, flipchart paper, colored markers, note paper, pens/pencils, colored flash cards), and have these items available at the Partnering session. Provide copies of documents for distribution to all attendees. Provide a Facilitator experienced in conducting Partnering Workshops, and who is acceptable to both the Government and the Contractor. The Facilitator is responsible for leading the team in a timely manner and making sure that issues are identified and resolved. A list of Partnering Facilitators is available from the Contracting Officer.

a. Schedule the Initial Partnering Session for a duration of a half day day minimum. Locate this session at a place off the construction site, as agreed to by the Contracting Officer and the Contractor. It may take place concurrently with the Pre-Construction Meeting.

b. Schedule follow-on Partnering Session(s) for a maximum of 4 hours. Schedule them at no more than 3 to six month intervals. Participants are encouraged to utilize electronic means to expedite meetings. Meetings may be held at a location off-Base, at the project site, or in a Government Facility on Base. Follow-on meetings may be held concurrently with other scheduled meetings. Attendees need only be those required to resolve current issues. Recommend using the same Facilitator from the Initial Partnering session to achieve best results and for continuity.

1.11 ELECTRONIC MAIL (E-MAIL) ADDRESS

Establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments as text files, pdf files, and other similar formats. Within 10 days after contract award, 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 or terrorist threats. Multiple email addresses are not 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). Promptly notify the Contracting Officer, in writing, of any changes to this email address.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 32 17.00 20

COST-LOADED NETWORK ANALYSIS SCHEDULES (NAS)
02/15

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, include that submittal review time 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. The Project NAS must be cost-loaded and will provide the basis for progress payments. 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.

1.2 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. 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

Participate with the Contracting Officer 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) do not relieve the Contractor from compliance with requirements of the Contract Documents. Only bonds may be paid prior to acceptance of the Baseline Network Analysis Schedule (NAS) The acceptance of a Baseline NAS is a condition precedent to:

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

b. Processing Contractor's invoices(s) for construction activities/items

of work.

c. Review of any schedule updates.

Submittal of the Baseline Network Analysis Schedule, and subsequent schedule updates, is 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 will be accomplished, and accurately reflects the work that has been accomplished and how it was sequenced (as-built logic).

1.4 SOFTWARE

Prepare and maintain project schedules using Primavera P6. Importing data into P6 using data conversion techniques or third party software is cause for rejection of the submitted schedule.

A listing of Primavera P6 settings and parameters which must be used in preparing the Schedules are contained later in this specification section. Deviation from these settings and parameters, without prior consent of the Contracting Officer, is cause for rejection of schedule submission.

1.5 QUALIFICATIONS

The designated Scheduler for the project must have prepared and maintained at least 3 previous schedules of similar size and complexity of this contract using Primavera P3, Primavera SureTrak, or Primavera P6. At least one of the three must be in Primavera P6. Submit a resume outlining the qualifications of the Scheduler. Payment will not be processed until an acceptable Scheduler is provided.

1.6 NETWORK SYSTEM FORMAT

The system must 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 must 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 in Work Days

e. Physical Percent Complete

f. Start Date

g. Finish Date

h. Total Float

1.6.2 Schedule Activity Properties and Level of Detail

The NAS must identify all Government, Construction Quality Management (CQM), Construction activities planned for the project and all other activities that could impact project completion if delayed. Create separate activities 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 must have predecessor and successor ties. No activity must have open start or open finish (dangling) logic. Minimize redundant logic ties. Once an activity exists on the schedule it must not be deleted or renamed to change the scope of the activity and must not be removed from the schedule logic without approval from the Contracting Officer. While an activity cannot be deleted, where said activity is no longer applicable to the schedule but must remain within the logic stream for historical record, it can be changed to a milestone. Document any such change in the milestone's "Notebook", including a date and explanation for the change. The ID number for a deleted activity must not be re-used for another activity. Within the Baseline Schedule 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 must be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days.

1.6.2.1 Activity Categories

1.6.2.1.1 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 a 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. Show each delivery with relationship tie to the Construction Activity specifically for the delivery.

1.6.2.1.2 Government Activities

Government and other agency activities that could impact progress must 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, and delivery of Government Furnished Material/Equipment.

1.6.2.1.3 Quality Management (QM) Activities

The Preparatory Phase and Initial Phase for each Definable Feature of Work identified in the Contractor's Quality Control Plan must be added to each Three-Week Look Ahead Schedule referenced in the paragraph THREE-WEEK LOOK AHEAD SCHEDULE. The Follow-up Phase will be represented by the Construction Activities in the Baseline Schedule and in the schedule updates.

1.6.2.1.4 Construction Activities

No on-site construction activity may have a duration in excess of 20 working days. Contractor activities must be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days, unless otherwise defined in this contract.

1.6.2.1.5 Turnover and Closeout Activities

Include activities with all items on the NAVFAC Red Zone Checklist/POAM that are applicable to this project. As a minimum, 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 Contract Completion Date (CCD), whichever is sooner.

1.6.2.2 Contract Milestones and Constraints

1.6.2.2.1 Project Start Date Milestones

Include as the first activity on the schedule a start milestone titled "Contract Award", which must have a Mandatory Start constraint equal to the Contract Award Date.

1.6.2.2.2 Facility Turnover Planning Meeting Milestones

See paragraph ACTIVITY CATEGORIES above.

1.6.2.2.3 Substantial Completion Milestone

Include an unconstrained finish milestone on the schedule titled "Substantial Completion". Substantial Completion is defined as the point in time the Government would consider the project ready for beneficial occupancy wherein by mutual agreement of the Government and Contractor, Government use of the facility is allowed while construction access continues in order to complete remaining items (e.g. punch list and other close out submittals).

1.6.2.2.4 Projected Completion Milestone

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. This milestone must have the Contract Completion (CCD) milestone as its only successor.

1.6.2.2.5 Contract Completion Date (CCD) Milestone

Include as the last activity on the schedule a finish milestone titled "Contract Completion (CCD)". Calculation of schedule updates must 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 must reflect positive float on the longest path.

1.6.2.3 Work Breakdown Structure & Activity Code

At a minimum, the Contractor must establish a Work Breakdown Structure

(WBS) and provide activity codes identified as follows:

1.6.2.3.1 Work Breakdown Structure (WBS)

Group all activities and milestones within appropriate WBS categories including, at a minimum, the following:

a. Project Milestones:

(1) Management Milestones

(2) Project Administrative Meetings

b. Pre-Construction Phase:

(1) Submittals and Reviews

(2) Procurement

c. Construction Phase; Create multiple sub-sections in accordance with project specific categories of work including in WBS descending order as follows:

(1) General Area

(a) Type of Work Item

1. Location

d. Commissioning & Testing:

(1) Specific area/locations of commissioning

(2) Final Testing

(3) Training

e. Project Closeout: Include activity items such as Punchlist, Demobilization, O&M, As-built Drawings, and As-built NAS.

f. Modifications: Create multiple sub-sections as the project progresses identified by modifications issued.

1.6.2.3.2 Responsibility Code

All activities in the project schedule must be identified with the party responsible for completing the task. Activities must not belong to more than one responsible party.

1.6.2.3.3 Construction Specification Institute (CSI) Masterformat Code

Identify all activities in the project schedule with its respective Specification Section number. Activities must not belong to more than one Section number. If an activity does not have an applicable CSI Code (e.g. Mobilize), the code must be "0000".

1.6.2.4 Anticipated Weather Lost Work Days

Use the National Oceanic and Atmospheric Administration's (NOAA) historical

monthly averages for days with precipitation, using a nominal 30-year, greater than 0.10 inch amount parameter, as indicated on the Station Report for the NOAA location closest to the project site as the basis for establishing a "Weather Calendar" showing the number of anticipated non-workdays for each month due to adverse weather, in addition to Saturdays, Sundays and all Federal Holidays as non-work days. 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 are 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 Cost Loading

1.6.2.5.1 Cost Loading Activities

Assign Material and Equipment Costs, for which payment will be requested in advance of installation, to their respective procurement activity (i.e., the material/equipment on-site activity). Assign cost for material/equipment, paid for after installation; labor; and construction equipment to their respective Construction Activities. The value of commissioning, testing and closeout WBS section may 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.

1.6.2.5.2 Quantities and Units of Measure

Each cost loaded activity must have a detailed quantity breakdown and unit of measure. Lump sum costing is not acceptable.

1.6.3 Schedule Software Settings and Restrictions

a. Activity Constraints: Date/time constraint(s), other than those required by the contract, are not 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 as described in paragraph REQUIRED TABULAR REPORTS.

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

c. Software Settings: Handle schedule calculations and Out-of-Sequence progress (if applicable) through Retained Logic, not Progress Override. Show all activity durations and float values in days. Show activity progress using Remaining Duration. Set default activity type to "Task Dependent".

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

(1) General: Define or establish Calendars and Activity Codes at the "Project" level, not the "Global" level.

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

(a) Set time periods for P6 to 8.0 Hours/Day, 40.0 Hours/Week, 172.0 Hours/Month and 2000.0 Hours/Year.

(b) Use assigned calendar to specify the number of work hours for each time period: Must be checked.

(3) Admin Drop-Down Menu, Admin Preferences, Earned Value Tab:

(a) Earned Value Calculation: Use "Budgeted values with current dates".

(4) Project Level, Dates Tab:

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

(5) Project Level, Defaults 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 must reflect Saturday, Sunday and all Federal holidays as non-work days. Alternative calendars may be used with Contracting Officer approval.

(6) Project Level, Calculations Tab:

(a) Activity percent complete based on activity steps: Must be Checked.

(b) Reset Remaining Duration and Units to Original: Must be Checked.

(c) Subtract Actual from At Completion: Must be Checked.

(d) Recalculate Actual units and Cost when duration percent(%) complete changes: Must be Checked.

(e) Link Actual to Date and Actual This Period Units and Cost: Must be Checked.

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

(g) Update units when costs change on resource assignments: Must be Unchecked.

(7) Project Level, Settings Tab:

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

(8) 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

Include the following reports with the Baseline, Monthly Update and any other required schedule submittals:

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 mitigation measures to minimize);

(9) Description of current and future schedule problem areas.

Each entry in the narrative report must cite the respective Activity ID and Activity Description, the date and reason for the change, and description of the change.

c. Earned Value Report: List all activities having a budget amount cost loaded. Compile total earnings on the project from notice to proceed to current progress payment request. 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 Monthly Network Analysis Updates

Meet with Government representatives 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 invoice. Submit an acceptable, updated schedule to the Government regardless of whether a Contractor's invoice is submitted for the given period. The Contractor and Government must consent to agree on percentage of payment for each activity progressed during the update period. Monthly update schedules must incorporate as-built events as they occurred and provide ongoing status of anticipated finish dates. As-built events must correspond to contemporaneous records including but not limited to submittals, daily production reports and quality control reports.

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 program files.

1.7.2 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 must reflect the exact manner in which the project was actually constructed.

1.8 CONTRACT MODIFICATION

Submit a Time Impact Analysis (TIA) with each cost and time proposal for a proposed change. TIA must 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 must be in both narrative and schedule form. The narrative must define the scope and conditions of the change; provide start and finish dates of impact, successor and predecessor activity to impact period, responsible party; describe how it originated, and how it impacts the schedule. The schedule submission must consist of three native files:

(1) Fragnet used to define the scope of the changed condition

(2) Most recent accepted schedule update as of the time of the proposal or claim submission that has been updated to show all activity progress as of the time of the impact start date.

(3) The impacted schedule that has the fragnet inserted in the updated schedule and the schedule “run” so that the new completion date is determined.

b. For claimed as-built project delay, the inserted fragnet TIA method must be modified to account for as-built events known to occur after the data date of schedule update used.

c. All TIAs must include any mitigation, and must determine the apportionment of the overall delay assignable to each individual delay. The associated narrative must clearly describe the findings in a chronological listing beginning with the earliest delay event.

(1) Identify types of delays as follows:

(a) Excusable Delay: Force-Majeure (e.g. weather) - Contractor may receive time extension, but time will not be compensable.

(b) Inexcusable Delay: Contractor Responsibility – Contractor will not receive time extension.

(c) Compensable Delay: Government Responsibility – Contractor may receive compensable time extension.

(2) If a combination of delay types occurs, it is considered Concurrent Delay, which is defined in the following combinations:

(a) Excusable Delay and Compensable Delay results in Excusable Delay

(b) Excusable Delay and Inexcusable Delay results in Inexcusable Delay

(c) Compensable Delay and Inexcusable Delay results in Excusable Delay

d. Submit Data disks containing the narrative and native schedule files.

e. Unless the Contracting Officer requests otherwise, only add conformed contract modifications into the Project NAS.

1.8.1 No Reservation of Rights

All direct costs, indirect cost, and time extensions will be negotiated and made full, equitable and final at the time of modification issuance.

1.9 PROJECT FLOAT

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

The use of Resource Leveling or other techniques used for the purpose of artificially adjusting activity durations to consume float and influence critical path is prohibited.

1.10 THREE-WEEK LOOK AHEAD SCHEDULE

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. Key the work plans to NAS activity numbers and update each week

to show the planned work for the current and following two-week period. Additionally, include upcoming outages, closures, field evaluation tests, 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, derived from but maintained separately from the Project NAS on an electronic spreadsheet program and printed on 8-1/2 by 11 inch sheets as directed by the Contracting Officer. Activities must not exceed 5 working days in duration and have sufficient level of detail to assign crews, tools and equipment required to complete the work. Deliver three hard copies and one electronic file of the 3-Week Look Ahead Schedule to the Contracting Officer no later than 8 a.m. each Monday and review during the weekly CQC Coordination or Production Meeting.

1.11 CORRESPONDENCE AND TEST REPORTS

All correspondence (e.g., letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs) must reference Schedule activity IDs that are being addressed. All test reports (e.g., concrete, soil compaction, weld, pressure) must reference schedule activity IDs that are being addressed.

1.12 ADDITIONAL SCHEDULING REQUIREMENTS

Any references to additional scheduling requirements, including systems to be inspected, tested and commissioned, that are located throughout the remainder of the Contract Documents, are subject to all requirements of this section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

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 or commencing work on site.

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.

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 Contractor QC 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 this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1 Government Approved (G)

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings."

1.3.2 Sustainability Reporting Submittals (S)

Submittals for Guiding Principle Validation (GPV) or Third Party Certification (TPC) are indicated with an "S" designation. Submit the information required by the technical sections that demonstrates compliance with the sustainable requirement, and for inclusion in the Sustainability Notebook as required by Section 01 33 29 SUSTAINABILITY REPORTING. A full submittal for an item may be provided under another SD; however, for the "S" submittal, only provide that portion of the submittal that demonstrates compliance with the sustainable requirement. If the sustainable submittal does require Government Approval, it may be tagged under another SD with a "G."

Schedule submittals for these items throughout the course of construction as provided; do not wait until closeout.

1.4 FORWARDING SUBMITTALS REQUIRING GOVERNMENT APPROVAL

1.4.1 Submittals Required from the Contractor

As soon as practicable after award of contract, and before procurement of fabrication, forward to the Contracting Officer submittals required in the technical sections of this specification, including shop drawings, product data and samples. Indicate on each submittal whether the submittal pertains to work for Phase 2 or Phase 3 or both Phase 2 and 3. Forward one copy of the transmittal form for all submittals to the Resident Officer in Charge of Construction.

The Architect-Engineer for this project will review and approve for the Contracting Officer those submittals reserved for Contracting Officer approval to verify submittals comply with the contract requirements.

1.4.1.1 O&M Data

The Architect-Engineer for this project will review and approve for the Contracting Officer O&M Data to verify the submittals comply with the contract requirements; submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.5 PREPARATION

1.5.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels to office of approving authority. Transmit submittals with transmittal form prescribed by Contracting Officer and standard for project. On the transmittal form identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph IDENTIFYING SUBMITTALS of this section. Process transmittal forms to record actions regarding samples .

1.5.2 Identifying Submittals

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

Identify submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a. Project title and location.

b. Construction contract number.

c. Date of the drawings and revisions.

d. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other subcontractor associated with the submittal.

e. Section number of the specification section by which submittal is required.

f. Submittal description (SD) number of each component of submittal.

g. When a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission.

h. Product identification and location in project.

1.5.3 Format for SD-02 Shop Drawings

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

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

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

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

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

Submit drawings PDF format.

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

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

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

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

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

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

the specified organization's reference standard.

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal and marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will not be accepted for expedition of construction effort.

Submit manufacturer's instructions prior to installation.

1.5.5 Format of SD-04 Samples

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

a. Sample of Equipment or Device: Full size.

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

c. Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

d. Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

e. Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.

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

g. Sample Panel: 4 by 4 feet.

h. Sample Installation: 100 square feet.

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

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

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

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

1.5.6 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inches paper.

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

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

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

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

1.5.9 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

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

1.5.10 Source Drawings for Shop Drawings

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

1.5.10.1 Terms and Conditions

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

These electronic Source Drawing files are not construction documents. Differences may exist between the Source Drawing files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic Source Drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source Drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing 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 or modifies these electronic Source Drawing files for use in producing construction data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

1.5.11 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. Compile the submittal file as a single, complete document, to include the Transmittal Form described within. Name the electronic submittal file specifically according to its contents, coordinate the file naming convention with the Contracting Officer. Electronic files must be of sufficient quality that all information is legible. Electronic format shall be in PDF, unless otherwise specified or directed by the Contracting Officer. Generate PDF files from original documents with bookmarks so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file. When required, the electronic file must include a valid electronic signature, or scan of a signature.

Email electronic submittal documents fewer than 10MB to an email address as directed by the Contracting Officer. Provide electronic documents over 10MB on an optical disc, or through an electronic file sharing system such as the AMRDEC SAFE Web Application located at the following website: https://safe.amrdec.army.mil/safe/.

Provide hard copies of submittals when requested by the Contracting Officer. Up to 2 additional hard copies of any submittal may be requested at the discretion of the Contracting Officer, at no additional cost to the Government.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Samples SD-04 Samples

a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.

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

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.7 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.

1.7.1 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.

1.7.2 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.

1.7.3 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.

1.7.4 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.

1.8 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.

Column (f): Indicate approving authority for each submittal.

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.

1.8.1 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.

1.8.2 Contractor Use of Submittal Register

Update the following fields 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.

1.8.3 Approving Authority Use of Submittal Register

Update the following fields.

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.

1.8.4 Action Codes

Entries for columns (j) and (o), are to be used are as follows (others may be prescribed by Transmittal Form):

1.8.4.1 Government Review Action Codes

"A" - "Approved as submitted"; "Completed"

"B" - "Approved, except as noted on drawings"; "Completed"

"C" - "Approved, except as noted on drawings; resubmission required"; "Resubmit"

"D" - "Returned by separate correspondence"; "Completed"

"E" - "Disapproved (See attached)"; "Resubmit"

"F" - "Receipt acknowledged"; "Completed"

"G" - "Other (Specify)"; "Resubmit"

"X" - "Receipt acknowledged, does not comply with contract requirements"; "Resubmit"

1.8.5 Copies Delivered to the Government

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

1.9 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."

e. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 15 working days for submittals for QC Manager approval and 20 working days for submittals for Contracting Officer approval. Period of review for submittals with Contracting Officer approval begins when Government receives submittal from QC organization.

f. For submittals requiring review by fire protection engineer, allow review period, beginning when Government receives submittal from QC organization, of 30 working days for return of submittal to the Contractor.

g. Period of review for each resubmittal is the same as for initial

submittal.

1.9.1 Reviewing, Certifying, Approving Authority

The QC organization is responsible for reviewing and certifying that submittals are in compliance with contract requirements. Approving authority on submittals is QC Manager unless otherwise specified for specific submittal. At each "Submittal" paragraph in individual specification sections, a notation "G," following a submittal item, indicates Contracting Officer is approving authority for that submittal item. An "S" following a submittal item, indicates that the QC Manager is the approving authority, and that a copy of the approved submittal must be provided to the Designer of Record.

1.9.2 Constraints

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

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

When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

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

1.9.3 QC Organization Responsibilities

a. Note date on which submittal was received from Contractor on each submittal.

b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.

c. Review submittals for conformance with project design concepts and compliance with contract documents.

d. Act on submittals, determining appropriate action based on QC organization's review of submittal.

(1) When QC Manager is approving authority, take appropriate action on submittal from the possible actions defined in paragraph APPROVED SUBMITTALS.

(2) When Contracting Officer is approving authority or when variation has been proposed, forward submittal to Government with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.

e. Ensure that material is clearly legible.

f. Stamp each sheet of each submittal with QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

(1) When approving authority is Contracting Officer, QC organization will certify submittals forwarded to Contracting Officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with contract Number (use project contract number), is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC Manager _____, Date _____"
(Signature)

(2) When approving authority is QC Manager, QC Manager will use the following approval statement when returning submittals to Contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with contract Number (use project contract number), is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC Manager _____, Date _____"
(Signature)

g. Sign certifying statement or approval statement. The QC organization member designated in the approved QC plan is the person signing certifying statements. The use of original ink for signatures is required. Stamped signatures are not acceptable.

h. Update submittal register as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by Contracting Officer.

i. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

j. For "S" submittals, provide a copy of the approved submittal to the Designer of Record.

1.10 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received from QC Manager.

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 REVIEW NOTATIONS and with markings appropriate for action

indicated.

1.10.1 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.

1.11 DISAPPROVED 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 Contract clause 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.

1.12 APPROVED SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are satisfactory.

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

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

necessary.

1.13 APPROVED SAMPLES

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 --

ATTACHMENT
SUBMITTAL REGISTER

SUBMITTAL REGISTER

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CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAG# RAPH	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		01 20 00.00 20	SD-01 Preconstruction Submittals															
			Schedule of Prices	1.3	G													
		01 30 00	SD-01 Preconstruction Submittals															
			View Location Map	1.3	G													
			Progress and Completion	1.4	G													
			Pictures															
		01 32 17.00 20	SD-01 Preconstruction Submittals															
			Qualifications	1.5	G													
			Baseline Network Analysis	1.3	G													
			Schedule															
			SD-07 Certificates															
			Monthly Network Analysis	1.7.1	G													
			SD-11 Closeout Submittals															
			As-Built Schedule	1.7.2	G													
		01 33 00	SD-01 Preconstruction Submittals															
			Submittal Register	1.8	G													
		01 35 26	SD-01 Preconstruction Submittals															
			Accident Prevention Plan (APP)	1.8	G													
			SD-06 Test Reports															
			Monthly Exposure Reports	1.4														
			Notifications and Reports	1.13														
			Accident Reports	1.13.2	G													
			LHE Inspection Reports	1.13.3														
			SD-07 Certificates															
			Contractor Safety Self-Evaluation	1.5														
			Checklist															

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		01 35 26	Crane Operators/Riggers	1.7.1.5														
			Standard Lift Plan	1.8.2.2	G													
			Critical Lift Plan	1.8.2.3	G													
			Naval Architecture Analysis	1.8.2.3	G													
			Activity Hazard Analysis (AHA)	1.9														
			Confined Space Entry Permit	1.10.1														
			Hot Work Permit	1.10.1														
			Certificate of Compliance	1.13.4														
			Third Party Certification of	1.13.5														
			Barge-Mounted Mobile Cranes															
			License Certificates	1.15														
			Radiography Operation Planning	1.15.1	G													
			Work Sheet															
		01 45 00.00 20	SD-01 Preconstruction Submittals															
			Construction Quality Control (QC)	1.6.1	G													
			Plan															
			Basis of Design and Design	1.9.1														
			Intent															
			Contract Document Review	1.9.2														
		01 50 00	SD-01 Preconstruction Submittals															
			Construction Site Plan	1.3	G													
			Traffic Control Plan	3.4.1	G													
			SD-06 Test Reports															
			Backflow Preventer Tests	2.2.5														
			SD-07 Certificates															
			Backflow Tester	1.4.1														

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		01 50 00	Backflow Preventers	1.4														
		01 57 19	SD-01 Preconstruction Submittals															
			Preconstruction Survey	1.6.1	G													
			Solid Waste Management Permit	1.10	G													
			Regulatory Notifications	1.6.2	G													
			Environmental Protection Plan	1.7	G													
			Stormwater Notice of Intent	3.2.1.2	G													
			Stormwater Pollution Prevention Plan	3.2.1.1	G													
			Dirt and Dust Control Plan	1.7.9.1	G													
			Employee Training Records	1.6.5	G													
			Environmental Manager Qualifications	1.6.4	G													
			SD-06 Test Reports															
			Laboratory Analysis		G													
			Inspection Reports	3.2.1.3	G													
			Solid Waste Management Report	3.7.2.1	G													
			SD-07 Certificates															
			Employee Training Records	1.6.5	G													
			ECATTS Certificate Of Completion	1.4.1.2	G													
			Erosion and Sediment Control Inspector	1.6.5														
			SD-11 Closeout Submittals															
			Stormwater Pollution Prevention Plan Compliance Notebook	3.2.1.4	G													

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		01 57 19	Stormwater Notice of Termination	3.2.1.5	G													
			Waste Determination	3.7.1	G													
			Documentation															
			Disposal Documentation for	3.7.3.6	G													
			Hazardous and Regulated Waste															
			Assembled Employee Training	1.6.5	G													
			Records															
			Solid Waste Management Permit	1.10	G													
			Solid Waste Management Report	3.7.2.1	G													
			Contractor Hazardous Material	3.8.1	G													
			Inventory Log															
			Hazardous Waste/Debris	3.7.3.1	G													
			Management															
			Regulatory Notifications	1.6.2	G													
			Sales Documentation	3.7.2.1	G													
			Contractor Certification		G													
			As-Built Topographic Survey		G													
		01 58 00	SD-02 Shop Drawings															
			preliminary drawing indicating	1.3.1	G													
			layout and text content															
		01 78 00	SD-03 Product Data															
			Warranty Management Plan	1.5.1														
			Warranty Tags	1.5.4														
			Final Cleaning	3.3														
			Spare Parts Data	1.4														
			SD-08 Manufacturer's Instructions															

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		01 78 00	Preventative Maintenance	3.4														
			Condition Monitoring (Predictive	3.4														
			Testing)															
			Inspection	3.4														
			Instructions	1.5.1														
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.2	G													
			Manuals															
			SD-11 Closeout Submittals															
			As-Built Drawings	3.1	G													
			Certification of EPA Designated	2.1	G													
			Items															
		01 78 23	SD-10 Operation and Maintenance															
			Data															
			Training Plan	3.1.1	G													
			Training Outline	3.1.3	G													
			Training Content	3.1.2	G													
			SD-11 Closeout Submittals															
			Training Video Recording	3.1.4	G													
			Validation of Training Completion	3.1.6	G													
		01 78 24.00 20	SD-11 Closeout Submittals															
			eOMSI, Progress Submittal	1.4.1	G													
			eOMSI, Prefinal Submittal	1.4.2	G													
			eOMSI, Final Submittal	1.4.3	G													
		02 41 00	SD-01 Preconstruction Submittals															

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		02 41 00	Demolition Plan	1.2.1	G													
			Existing Conditions	1.11														
			SD-07 Certificates															
			Notification	1.7	G													
			SD-11 Closeout Submittals															
			Receipts	3.3.4														
		02 82 16.00 20	SD-03 Product Data															
			Local exhaust equipment	3.1.4	G													
			Vacuums	3.1.5	G													
			Respirators	3.1.1.1	G													
			Pressure differential automatic	3.1.4	G													
			recording instrument															
			Amended water	1.2.2	G													
			Glovebags	3.1.7	G													
			Material Safety Data Sheets	1.3.8	G													
			(MSDS) for all materials															
			Encapsulants	2.1	G													
			SD-06 Test Reports															
			Air sampling results	1.5.5	G													
			Pressure differential recordings	1.5.6	G													
			for local exhaust system															
			Asbestos disposal quantity report	3.3.3.2	G													
			Clearance sampling	3.2.6.3	G													
			SD-07 Certificates															
			Asbestos hazard abatement plan	1.3.9	G													
			Testing laboratory	1.3.10	G													

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02 82 16.00 20	Private qualified person	1.5.1	G													
			documentation															
			Contractor's license	1.5.4	G													
			Competent person	1.5.2	G													
			Worker's license	1.5.3	G													
			Landfill approval	1.3.11	G													
			Employee training	1.3.3	G													
			Medical certification	1.3.12	G													
			Waste shipment records	1.3.11	G													
			Respiratory Protection Program	1.3.6	G													
			Delivery tickets	1.3.11	G													
			Vacuums	3.1.5	G													
			Water filtration equipment	3.1.2.3	G													
			Ventilation systems	3.1.5	G													
			equipment used to contain	3.1	G													
			airborne asbestos fibers															
			encapsulants	2.1	G													
			Notifications	1.3.4														
			SD-11 Closeout Submittals															
			Notifications	1.3.4	G													
			Rental equipment	1.6.1	G													
			Respirator program records	1.3.6.1	G													
			Permits and licenses	1.3.4	G													
			Protective clothing		G													
			decontamination facility notification															
		02 82 33.13 20	SD-03 Product Data															

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		02 82 33.13 20	Vacuum Filters	1.6.4	G													
			Respirators	1.6.1	G													
			SD-06 Test Reports															
			sampling results	1.5.2.3	G													
			Occupational and Environmental	1.5.2.3	G													
			Assessment Data Report															
			SD-07 Certificates															
			Qualifications of CP	1.5.1.1	G													
			Testing Laboratory	1.5.1.3	G													
			Training Certification	1.5.1.2	G													
			Third Party Consultant	1.5.1.4	G													
			Qualifications															
			lead-based paint/paint with lead	1.5.3	G													
			removal/control plan															
			Rental equipment notification	1.6.3	G													
			Respiratory Protection Program	1.5.2.6	G													
			Hazard Communication Program	1.5.2.7	G													
			EPA or State approved	3.5.2	G													
			hazardous waste treatment,															
			storage, or disposal facility															
			Lead Waste Management Plan	1.5.2.8	G													
			Vacuum filters	1.6.4	G													
			Clearance Certification	3.5.1.1	G													
			SD-11 Closeout Submittals															
			hazardous waste manifest	3.5.2.1	G													
			Medical Examinations	1.5.2.4	G													

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		02 82 33.13 20	Training Certification	1.5.1.2	G													
		02 84 16	SD-07 Certificates															
			Qualifications of CIH	1.8.1	G													
			Training Certification	1.8.1	G													
			PCB and Lamp Removal Work Plan	1.8.2	G													
			PCB and Lamp Disposal Plan	1.8.3	G													
			SD-11 Closeout Submittals															
			Transporter certification	3.5.2	G													
			Certification of Decontamination	3.2.4														
			Certificate of Disposal and/or recycling	3.5.2.1														
			DD Form 1348-1	3.5.3.1														
		03 01 30.71	SD-05 Design Data															
			Job mix formula	1.4.1.1														
			SD-06 Test Reports															
			aggregate	2.1.2														
			Epoxy resin binder	2.1.1.1														
			Epoxy grout	2.1.1.2														
			SD-07 Certificates															
			Epoxy resin binder	2.1.1.1														
			Epoxy grout	2.1.1.2														
			SD-08 Manufacturer's Instructions															
			Epoxy	2.1.1														
		03 30 00	SD-01 Preconstruction Submittals															
			Concrete Curing Plan	1.6.3.1														

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		03 30 00	Quality Control Plan	1.6.5	G													
			Quality Control Personnel	1.6.6	G													
			Certifications															
			Quality Control Organizational	1.6.6														
			Chart															
			Laboratory Accreditation	1.6.8	G													
			Form Removal Schedule	1.6.2.1	G													
			SD-02 Shop Drawings															
			Formwork	1.6.2.1														
			Reinforcing steel	1.6.2.2	G													
			SD-03 Product Data															
			Joint sealants	2.4.8														
			Joint filler	2.4.7														
			Materials for Forms	2.1														
			Cementitious Materials	2.4.1														
			Vapor barrier	2.4.6														
			Concrete Curing Materials	2.3.3														
			Reinforcement	2.5														
			Admixtures	2.4.5														
			Mechanical Reinforcing Bar	2.5.2														
			Connectors															
			Pumping Concrete	1.6.3.2														
			SD-05 Design Data															
			mix design	2.3.1	G													
			SD-06 Test Reports															
			Concrete mix design	1.6.1.1	G													

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		03 30 00	Fly ash	1.6.4.1														
			Pozzolan	1.6.4.1														
			Ground granulated blast-furnace	1.6.4.2														
			slag															
			Aggregates	2.4.3														
			Compressive strength tests	3.12.2.3	G													
			Unit weight of structural concrete	3.12.2.5														
			Air Content	3.12.2.4														
			Slump Tests	3.12.2.1														
			Water	2.4.2														
			SD-07 Certificates															
			Reinforcing Bars	2.5.1														
			Welder Qualifications	1.7														
			SD-08 Manufacturer’s Instructions															
			Curing Compound	2.3.3														
		04 20 00	SD-03 Product Data															
			Local/Regional Materials	1.2.1														
			Environmental Data	1.2.2														
			Cement	2.4.4	G													
			Insulation	2.10	G													
			Cold Weather Installation	1.6.2	G													
			Water-Repellant Admixture	2.5	G													
			SD-04 Samples															
			Concrete Masonry Units (CMU)	2.2	G													
			Anchors, Ties, and Bar	2.7	G													
			Positioners															

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		04 20 00	Joint Reinforcement	2.8	G													
			Insulation	2.10	G													
			Portable Panel	1.4.1	G													
			SD-05 Design Data															
			Pre-mixed Mortar	2.4.5	G													
			Unit Strength Method	1.2.4.1	G													
			SD-06 Test Reports															
			Efflorescence Test	3.24.3	G													
			Field Testing of Mortar	3.24.1	G													
			Field Testing of Grout	3.24.2	G													
			Prism tests	3.24.4	G													
			Masonry Cement	2.4.4	G													
			Single-Wythe Masonry Wall	3.24.5														
			Water Penetration Test															
			SD-07 Certificates															
			Concrete Masonry Units (CMU)	2.2														
			Anchors, Ties, and Bar	2.7														
			Positioners															
			Expansion-Joint Materials	2.11														
			Joint Reinforcement	2.8														
			Masonry Cement	2.4.4														
			Insulation	2.10														
			Insulation	2.10														
			Precast Concrete Items	2.3														
			Admixtures for Masonry Mortar	2.4.1														
			Admixtures for Grout	2.6.1														

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		04 20 00	SD-08 Manufacturer's Instructions															
			Masonry Cement	2.4.4														
			SD-10 Operation and Maintenance															
			Data															
			Plastic Identification	1.2.3														
			Take-Back Program	3.23.2														
		05 21 00	SD-01 Preconstruction Submittals															
			Welder Qualification	1.3.2														
			SD-02 Shop Drawings															
			Steel Joist Framing	1.3.1	G													
			SD-06 Test Reports															
			Erection Inspection	3.4														
			Welding Inspections	3.4														
			SD-07 Certificates															
			Certification of Compliance	1.3.2														
		05 30 00	SD-02 Shop Drawings															
			Fabrication Drawings	1.3.5	G													
			SD-03 Product Data															
			Accessories	2.2														
			Deck Units	2.1														
			Galvanizing Repair Paint	2.1.4														
			Mechanical Fasteners	2.2.14														
			Touch-up Paint	2.1.4														
			Welding Equipment	1.3.3														
			Welding Rods and Accessories	1.3.3														
			SD-04 Samples															

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		05 30 00	Metal Roof Deck Units	2.1.1														
			Flexible Closure Strips	2.2.4														
			SD-05 Design Data															
			Deck Units	2.1	G													
			SD-07 Certificates															
			Powder-Actuated Tool Operator	1.3.2														
			Welder Qualifications	1.3.3														
			Welding Procedures	1.3.3														
			Fire Safety	1.3.4.1														
			Wind Storm Resistance	1.3.4.2														
			Manufacturer's Certificate	1.3.1														
		05 50 13	SD-02 Shop Drawings															
			structural steel door frames	2.5	G													
			angles and plates	2.4	G													
		06 10 00	SD-02 Shop Drawings															
			Nailing Strips;	2.2.1	G													
			SD-03 Product Data															
			Local/Regional Materials	1.10.1														
			Salvaged Lumber	2.1.2														
			Recovered Lumber	2.1.3														
			SD-06 Test Reports															
			Preservative-treated	1.4.3														
			SD-07 Certificates															
			Forest Stewardship Council	1.10.3														
			(FSC) Certification															
			Certificates of grade	1.8.1														

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		06 10 00	Preservative treatment	1.7														
			SD-11 Closeout Submittals															
			Local/Regional Materials	1.10.1														
			Adhesives	2.3.3														
			Certified Wood	1.10.2														
			Certified Wood	1.10.3														
		07 11 13	SD-07 Certificates															
			Materials	1.3														
		07 21 13	SD-03 Product Data															
			Block or board insulation	2.1	G													
			Vapor retarder	2.2														
			Pressure sensitive tape	2.3														
			Protection board or coating	2.4														
			Accessories	2.5														
			Certification	1.3														
			SD-08 Manufacturer’s Instructions															
			Block or Board Insulation	2.1														
			Adhesive	2.5.1														
		07 22 00	SD-02 Shop Drawings															
			Wood nailers	2.4														
			Tapered roof insulation	2.1.5	G													
			SD-03 Product Data															
			Fasteners	2.3	G													
			Insulation	2.1	G													
			Certification	1.4.2														
			Recycled materials	2.1.3														

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		07 22 00	Local/Regional Materials	1.4.3														
			SD-06 Test Reports															
			Flame spread and smoke	1.4.1														
			developed ratings															
			SD-07 Certificates															
			qualifications	1.3														
			SD-08 Manufacturer's Instructions															
			fasteners	2.3														
			insulation	2.1														
		07 52 00	SD-02 Shop Drawings															
			Roof plan	1.4.5	G													
			SD-03 Product Data															
			Modified Bitumen Sheets	2.1	G													
			Asphalt	2.3														
			Fiberglass Felt	2.1	G													
			Primer	2.5	G													
			Modified Bitumen Roof Cement	2.6	G													
			Pre-Manufactured Accessories	2.8														
			Fasteners And Plates	2.7	G													
			Warranty	1.9	G													
			SD-05 Design Data															
			Wind Uplift Calculations	1.4.4	G													
			SD-07 Certificates															
			Qualification of Manufacturer	1.4.1														
			Qualification of Applicator	1.4.2														
			Wind Uplift Resistance	1.4.4	G													

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		07 52 00	Fire Resistance	1.4.3	G														
			SD-08 Manufacturer's Instructions																
			Modified Bitumen Membrane	3.3.3	G														
			Application																
			Flashing	3.3.4	G														
			Temperature Limitations for	3.2.3.1															
			Asphalt																
			Primer	2.5															
			Fasteners	2.7.1															
			Cold Weather Installation	1.6	G														
			SD-11 Closeout Submittals																
			Warranty	1.9															
			Information Card	3.8															
			Instructions To Personnel	3.7															
		07 60 00	SD-02 Shop Drawings																
			Gutters	3.1.7	G														
			Downspouts	3.1.8	G														
			Gravel stops and fascias	3.1.5	G														
			Flashing at roof penetrations	3.1.9	G														
			Drip edge	3.1.6	G														
		07 84 00	SD-02 Shop Drawings																
			Firestopping System	2.1	G														
			SD-03 Product Data																
			Firestopping Materials	2.2	G														
			SD-06 Test Reports																
			Inspection	3.3	G														

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		07 84 00	SD-07 Certificates															
			Inspector Qualifications	1.5.2														
			Firestopping Materials	2.2														
			Installer Qualifications	1.5.1	G													
		07 92 00	SD-03 Product Data															
			Sealants	2.1														
			Primers	2.2														
			Bond breakers	2.3														
			Backstops	2.4														
			SD-07 Certificates															
			Sealant	3.3.6														
		08 11 13	SD-02 Shop Drawings															
			Doors	2.1	G													
			Doors	2.1	G													
			Frames	2.5	G													
			Frames	2.5	G													
			Accessories	2.3														
			Weatherstripping	2.6														
			SD-03 Product Data															
			Doors	2.1	G													
			Frames	2.5	G													
			Accessories	2.3														
			Weatherstripping	2.6														
			SD-04 Samples															
			Factory-applied enamel finish	2.8.4	G													
		08 71 00	SD-02 Shop Drawings															

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		08 71 00	Hardware schedule	1.3	G													
			Keying system	2.3.5														
			SD-03 Product Data															
			Hardware items	2.3	G													
			SD-08 Manufacturer's Instructions															
			Installation	3.1														
			SD-10 Operation and Maintenance															
			Data															
			Hardware Schedule	1.3	G													
			SD-11 Closeout Submittals															
			Key Bitting	1.4														
		08 91 00	SD-02 Shop Drawings															
			Wall louvers	1.4														
			Wall louvers	1.5														
			SD-03 Product Data															
			Metal Wall Louvers	2.2														
			SD-04 Samples															
			Wall louvers	1.4	G													
			Wall louvers	1.5	G													
			Door louvers	1.5	G													
		09 90 00	SD-03 Product Data															
			Local/Regional Materials	1.9.1														
			Materials	2.1														
			Coating	2.1	G													
			Manufacturer's Technical Data	2.1														
			Sheets															

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		09 90 00	SD-04 Samples															
			Color	1.11	G													
			SD-07 Certificates															
			Applicator's qualifications	1.3														
			SD-08 Manufacturer's Instructions															
			Application instructions	3.2.1														
			Mixing	3.5.2														
			Manufacturer's Material Safety	1.7.2														
			Data Sheets															
			SD-10 Operation and Maintenance															
			Data															
			Coatings:	2.1	G													
		10 14 01	SD-02 Shop Drawings															
			Approved Detail Drawings	3.1	G													
			SD-03 Product Data															
			Installation	3.1														
			Exterior Signage	1.2	G													
			Exterior Signage	2.1.1	G													
			SD-04 Samples															
			Exterior Signage	1.2	G													
			Exterior Signage	2.1.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Protection and Cleaning	3.1.2														
		10 44 16	SD-01 Preconstruction Submittals															
			Manufacturer's Data	2.1														

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		10 44 16	SD-02 Shop Drawings															
			Fire Extinguishers	2.1														
			Accessories	1.3.1														
			Cabinets	1.3.1														
			Wall Brackets	1.3.1														
			SD-03 Product Data															
			Fire Extinguishers	2.1														
			Accessories	1.3.1														
			Wall Brackets	1.3.1														
			Replacement Parts	3.2.1														
			SD-04 Samples															
			Fire Extinguisher	1.3.1														
			Wall Brackets	1.3.1														
			Accessories	1.3.1														
			SD-07 Certificates															
			Fire Extinguishers	2.1														
			Manufacturer's Warranty with	2.1														
			Inspection Tag															
		22 05 83.63	SD-03 Product Data															
			Installation Equipment	2.1	G													
			CIPP Lining Tube	2.2.1	G													
			Epoxy Resin	2.1	G													
			Liner Materials	2.1	G													
			SD-08 Manufacturer's Instructions															
			CIPP Manufacturer's Written	3.2	G													
			Installation Instructions															

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAG# RAPH	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		22 05 83.63	SD-11 Closeout Submittals															
			Report Summarizing The Extent	3.2	G													
			Of Pipe Lining Performed															
			Pre-Lining Inspection	3.2	G													
			Post-Lining Inspection	3.2	G													
			Manufacturer's Warranty	1.4	G													
			Record Drawings	3.2	G													
		23 00 00	SD-02 Shop Drawings															
			Detail Drawings	1.4.5														
			SD-03 Product Data															
			Metallic Flexible Duct	2.9.1.1														
			Manual Balancing Dampers	2.9.2														
			In-Line Centrifugal Fans	2.10.1.1														
			Test Procedures	1.4.6														
			SD-06 Test Reports															
			Performance Tests	3.9	G													
			Damper Acceptance Test	3.7														
			SD-07 Certificates															
			Bolts	1.4.1														
			SD-08 Manufacturer’s Instructions															
			Manufacturer's Installation	3.2														
			Instructions															
			Operation and Maintenance	3.11.2														
			Training															
			SD-10 Operation and Maintenance															
			Data															

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		23 00 00	Operation and Maintenance	3.11.1														
			Manuals															
			In-Line Centrifugal Fans	2.10.1.1	G													
			Air Handling Units		G													
		23 05 93	SD-07 Certificates															
			Independent TAB agency and	1.5.1	G													
			personnel qualifications															
			Advance Notice of Season 1 TAB	3.5	G													
			Field Work															
			Completed Season 1 Pre-TAB															
			Work Checklist; G															
		23 07 00	SD-03 Product Data															
			Pipe Insulation Systems	2.3														
			Pipe Insulation Systems	3.2														
			SD-08 Manufacturer's Instructions															
			Pipe Insulation Systems	2.3														
			Pipe Insulation Systems	3.2														
		23 23 00	SD-02 Shop Drawings															
			Refrigerant Piping System	2.3	G													
			SD-03 Product Data															
			Refrigerant Piping System	2.3														
			Spare Parts	1.5.2														
			Qualifications	1.3.1														
			Refrigerant Piping Tests	3.5														
			Verification of Dimensions	3.1														
			SD-06 Test Reports															

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		23 23 00	Refrigerant Piping Tests	3.5														
			SD-07 Certificates															
			Service Organization	2.1														
			SD-10 Operation and Maintenance															
			Data															
			Maintenance	1.5	G													
			Operation and Maintenance	3.4	G													
			Manuals															
			Demonstrations	3.4	G													
		23 81 00.00 20	SD-02 Shop Drawings															
			Field-assembled refrigerant	2.6.2														
			piping															
			Control system wiring diagrams	1.4.2														
			SD-03 Product Data															
			Packaged terminal units	2.1	G													
			Air conditioners	2.2	G													
			Filters	2.3														
			Thermostats	2.2.11														
			Refrigerant piping and	2.6														
			accessories															
			Coatings for finned tube coils	2.4														
			SD-06 Test Reports															
			Salt-spray tests	2.8.1														
			Start-up and initial operational	3.8.3														
			tests															
			SD-08 Manufacturer's Instructions															

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		23 81 00.00 20	Packaged terminal units	2.1														
			Air conditioners	2.2														
			Filters	2.3														
			Thermostats	2.2.11														
			Refrigerant piping and	2.6														
			accessories															
			SD-10 Operation and Maintenance															
			Data															
			Packaged terminal units	2.1														
			Air conditioners	2.2														
			Filters	2.3														
			Thermostats	2.2.11														
			SD-11 Closeout Submittals															
			Posted operating instructions	1.4.4														
		23 83 00.00 20	SD-02 Shop Drawings															
			Heater installation drawing	3.1														
			SD-03 Product Data															
			Electric baseboard units	2.1	G													
			Unit thermostat	2.1.5														
			SD-10 Operation and Maintenance															
			Data															
			Electric baseboard units	2.1														
		26 08 00	SD-06 Test Reports															
			Acceptance tests and inspections	3.1	G													
			SD-07 Certificates															
			Qualifications	1.4.1	G													

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		26 08 00	Acceptance test and inspections	1.4.3	G													
			procedure															
		26 20 00	SD-02 Shop Drawings															
			Panelboards	2.10	G													
			Transformers	2.12	G													
			Marking strips	3.1.7.1	G													
			SD-03 Product Data															
			Receptacles	2.9	G													
			Circuit breakers	2.10.3	G													
			Switches	2.7	G													
			Transformers	2.12	G													
			Enclosed circuit breakers	2.11	G													
			Motor controllers	2.14	G													
			Manual motor starters	2.15	G													
			Surge protective devices	2.22	G													
			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-07 Certificates															
			Fuses	2.8	G													
			SD-09 Manufacturer’s Field															
			Reports															
			Transformer factory tests	2.24.1														

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		26 20 00	SD-10 Operation and Maintenance															
			Data															
			Electrical Systems	1.5.1	G													
		26 24 13	SD-02 Shop Drawings															
			Switchboard Drawings	1.5.2	G													
			SD-03 Product Data															
			Switchboard	2.2	G													
			SD-06 Test Reports															
			Switchboard Design Tests	2.5.2	G													
			Switchboard Production Tests	2.5.3	G													
			Acceptance Checks and Tests	3.5.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Switchboard Operation and	1.6.1	G													
			Maintenance															
			SD-11 Closeout Submittals															
			Assembled Operation and	1.6.2	G													
			Maintenance Manuals															
			Equipment Test Schedule	2.5.1	G													
			Required Settings	3.5	G													
		26 32 13.00 20	SD-02 Shop Drawings															
			Engine-Generator set and	1.5.1.1	G													
			auxiliary equipment															
			Auxiliary systems		G													
			SD-03 Product Data															
			Engine-generator set data	1.3.1	G													

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		26 32 13.00 20	Engine-generator set efficiencies	1.3.2	G													
			Diesel engine data	1.3.3	G													
			Generator and exciter data	1.3.4	G													
			Diesel engine-generator set	2.1	G													
			Auxiliary systems and equipment	2.2	G													
			Remote alarm annunciator	2.2.7	G													
			SD-05 Design Data															
			Capacity calculations for	1.3.5	G													
			engine-generator set															
			Calculations for brake mean	1.3.6	G													
			effective pressure															
			Torsional vibration stress	1.3.7	G													
			analysis computations															
			Capacity calculations for batteries	1.3.8	G													
			SD-06 Test Reports															
			Acceptance checks and tests	3.5.1	G													
			Functional acceptance tests	3.5.2	G													
			Functional acceptance test	3.4.4	G													
			procedure															
			SD-07 Certificates															
			Vibration isolation system	1.5.2	G													
			Fuel system	1.5.3	G													
			Start-up engineer	3.3	G													
			Instructor's	3.6.1	G													
			SD-09 Manufacturer’s Field															
			Reports															

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		26 32 13.00 20	Engine tests	2.6.1	G													
			Generator tests	2.6.2	G													
			Assembled engine-generator set	2.6.3	G													
			tests															
			SD-10 Operation and Maintenance															
			Data															
			Diesel engine-generator set	2.1	G													
			Auxiliary systems and equipment	2.2	G													
			Preliminary assembled operation	3.4.3	G													
			and maintenance manuals															
			SD-11 Closeout Submittals															
			Posted operating instructions	1.8.2	G													
			Training plan	3.6.2	G													
		26 36 23.00 20	SD-02 Shop Drawings															
			Automatic Transfer Switch	1.4.2	G													
			Drawings															
			SD-03 Product Data															
			Automatic Transfer Switches	2.1	G													
			SD-06 Test Reports															
			Acceptance Checks and Tests	3.3.1	G													
			Functional Acceptance Tests	3.3.2	G													
			SD-07 Certificates															
			Proof of Listing	1.4.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Automatic Transfer Switches	2.1	G													

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		26 41 00	SD-02 Shop Drawings															
			Overall lightning protection	1.4.1.1	G													
			system															
			Each major component	1.4.1.2	G													
			SD-06 Test Reports															
			Lightning Protection and	1.4.3	G													
			Grounding System Test Plan															
			Lightning Protection and	3.4.1	G													
			Grounding System Test															
			SD-07 Certificates															
			Lightning Protection System	1.2.3	G													
			Installers Documentation															
			Component UL Listed and	1.4.2	G													
			Labeled															
			Lightning protection system	1.4.4	G													
			inspection certificate															
			Roof manufacturer's warranty	3.1.1	G													
		26 51 00	SD-03 Product Data															
			LED drivers	2.1.2.1	G													
			Switches	2.3.2	G													
			Photocell switch	2.4	G													
			Exit signs	2.5	G													
			Emergency lighting equipment	2.6	G													
			Occupancy sensors	2.7	G													
			Relay Control Panel	2.8	G													
			Led Luminaires	2.1														

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		26 51 00	SD-06 Test Reports															
			Operating test	3.3														
			SD-10 Operation and Maintenance															
			Data															
			Lighting Control System	1.4.1	G													
			Operational Service	1.8														
		26 56 00	SD-01 Preconstruction Submittals															
			Photometric Plan	1.5.2	G													
			SD-03 Product Data															
			LED Luminaires	2.2	G													
			Luminaire Ballasts,	2.2.2	G													
			Photocell	2.3.1	G													
			SD-05 Design Data															
			Design Data for luminaires	1.5.3	G													
			SD-06 Test Reports															
			Operating test	3.2														
			SD-10 Operation and Maintenance															
			Data															
			Electronic Ballast Warranty	1.6.1														
			Operational Service	1.7														
		28 31 74.00 20	SD-02 Shop Drawings															
			System floor plans	1.6.4.1	G													
			System wiring diagrams	1.6.4.2	G													
			Conductor wire marker schedule	3.1	G													
			SD-03 Product Data															
			Control panel	2.2.1	G													

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		28 31 74.00 20	Storage batteries	2.1.3.1	G													
			Battery charger	2.1.3.2	G													
			Manual pull stations	2.2.2	G													
			Open-area (spot-type) smoke	2.2.3	G													
			detectors															
			Alarm horns	2.2.4.1	G													
			Visible appliances	2.2.4.2	G													
			Main annunciator	2.2.1.1	G													
			Master fire alarm boxes	2.2.5.1	G													
			Auxiliary transmitter	2.2.5.2	G													
			Master box pedestal		G													
			Master box or Radio master box		G													
			location light															
			Radio fire alarm master box or	2.2.5.3	G													
			auxiliary transmitter															
			interface panel	2.2.5.3	G													
			Combination auxiliary transmitter		G													
			and interface panel															
			Wiring	2.2.9	G													
			Ground rods	2.2.5.4														
			Conduit	2.2.6														
			Outlet boxes	2.2.7														
			Fittings for conduit and outlet	2.2.8														
			boxes															
			Surge suppression devices	2.3	G													
			SD-05 Design Data															

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		28 31 74.00 20	Power calculations	1.4.1.1	G													
			SD-06 Test Reports															
			2-wire smoke detectors	2.2.3.1	G													
			Preliminary testing	3.2.1	G													
			Final acceptance testing	3.2.2	G													
			SD-07 Certificates															
			Qualifications of installer	1.6.1	G													
			Qualifications of system	1.6.3	G													
			technician															
			SD-10 Operation and Maintenance															
			Data															
			Fire alarm system	2.1.1	G													
			SD-11 Closeout Submittals															
			System as-built drawings	1.6.4.3	G													
		31 23 00.00 20	SD-01 Preconstruction Submittals															
			Shoring and Sheeting Plan	1.7.1														
			Dewatering work plan	1.7.2														
			SD-06 Test Reports															
			Borrow Site Testing	1.6	G													
			Fill and backfill	3.16.2.1														
			Select material															
			Density tests	3.16.2.2														
			Moisture Content Tests	3.16.2.3														
		32 01 17.16	SD-03 Product Data															
			Installation of Sealant	3.4														
			SD-06 Test Reports															

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		32 01 17.16	Test Requirements	1.3														
		32 01 19	SD-03 Product Data															
			Manufacturer's	3.1.2.2	G													
			Recommendations															
			Equipment	3.1														
			SD-04 Samples															
			Materials	1.3.1	G													
		32 01 19.61	SD-03 Product Data															
			Joint sealant	2.1.1														
			SD-04 Samples															
			Joint filler	3.1.1														
			Separating tape	2.1.3.2														
			backer rod	2.1.3.1														
			Joint sealant	2.1.1														
			SD-06 Test Reports															
			Joint sealant	2.1.1														
			SD-07 Certificates															
			Equipment list	1.6														
			SD-08 Manufacturer’s Instructions															
			Joint sealant	2.1.1														
		32 11 23	SD-03 Product Data															
			Plant, Equipment, and Tools	2.1														
			SD-06 Test Reports															
			Sampling and Testing	1.4	G													
			Field Density Tests	1.4.2.4	G													
		32 11 33	SD-04 Samples															

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		32 11 33	Base course aggregate	2.2.1														
			Rigid pavement base course	2.2.1.1														
			SD-05 Design Data															
			Mix design	2.5														
			Job-mix formula	2.5														
			SD-06 Test Reports															
			plasticity index	3.7.2.1														
			plasticity index	3.7.2.1														
			Compressive strength	2.4.1														
			Compressive strength	2.4.1														
			moisture-density	2.5														
			Liquid limit	3.7.2.1														
			Sieve analysis of combined	3.7.2.1														
			material															
			Optimum moisture content and	3.7.2.6														
			maximum density															
			SD-07 Certificates															
			cement	2.1														
			Location of aggregate source	1.5.1														
			Method	1.5.1														
			Construction equipment list	1.5.1														
		32 12 10	SD-03 Product Data															
			Local/Regional Materials	1.3														
			SD-06 Test Reports															
			Sampling and Testing	3.7														
		32 12 15.13	SD-02 Shop Drawings															

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		32 12 15.13	Placement Plan	2.1	G													
			SD-03 Product Data															
			Diamond Grinding Plan	2.1.6	G													
			Mix Design	2.4	G													
			Contractor Quality Control	3.1	G													
			SD-04 Samples															
			Aggregates	2.2														
			Asphalt Cement Binder	2.3														
			SD-06 Test Reports															
			Aggregates	2.2	G													
			QC Monitoring	3.1.3.10														
			SD-07 Certificates															
			Asphalt Cement Binder	2.3	G													
			Testing Laboratory	3.7														
		32 13 11	SD-03 Product Data															
			Diamond Grinding Plan	2.1.6	G													
			Dowels	2.9.1	G													
			Dowel Bar Assemblies	2.9.2	G													
			Equipment	2.11														
			Proposed Techniques	3.1.2	G													
			SD-05 Design Data															
			Preliminary Proposed	2.13.2	G													
			Proportioning															
			Proportioning Studies	2.13.2	G													
			SD-06 Test Reports															
			Sampling and Testing	2.1.4.1	G													

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		32 13 11	Diamond Grinding of PCC Surfaces	2.1.6	G													
			Mixer Performance (Uniformity) Testing	2.11.2.3	G													
			Repair Recommendations Plan	3.9.1	G													
			SD-07 Certificates															
			Contractor Quality Control Staff	1.4.1	G													
			Laboratory Accreditation and Validation	1.4.3														
			NRMCA Certificate of Conformance	2.11														
		32 17 23.00 20	SD-03 Product Data															
			Reflective media for airfields	2.1.3														
			Reflective media for roads and streets	2.1.4														
			Paints for airfields	2.1.1														
			Paints for roads and streets	2.1.2														
			Equipment	1.5	G													
			Qualifications	1.8														
			Qualifications	1.9														
			SD-06 Test Reports															
			Reflective media for airfields	2.1.3														
			Reflective media for roads and streets	2.1.4														
			Paints for airfields	2.1.1														
			Paints for roads and streets	2.1.2														

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		32 17 23.00 20	SD-07 Certificates															
			Reflective media for airfields	2.1.3														
			Reflective media for roads and streets	2.1.4														
			Paints for airfields	2.1.1														
			Paints for roads and streets	2.1.2														
			Construction equipment list	1.5														
			SD-08 Manufacturer's Instructions															
			Paints for airfields	2.1.1														
			Paints for roads and streets	2.1.2														
		32 31 13	SD-02 Shop Drawings															
			Fence Assembly	1.3	G													
			Location of Gate, Corner, End, and Pull Posts	3.17.1	G													
			Gate Assembly	1.3	G													
			Gate Hardware and Accessories	2.18	G													
			Erection/Installation Drawings	1.3	G													
			SD-03 Product Data															
			Fence Assembly	1.3	G													
			Gate Assembly	1.3	G													
			Gate Hardware and Accessories	2.18	G													
			Zinc Coating	2.2	G													
			Fabric	2.3	G													
			Stretcher Bars	2.13	G													
			Concrete	2.21	G													
			SD-04 Samples															

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		32 31 13	Fabric	2.3	G													
			Posts	2.5	G													
			Braces	2.5	G													
			Line Posts	2.6	G													
			Sleeves	2.8	G													
			Top Rail	2.9	G													
			Tension Wire	2.12	G													
			Stretcher Bars	2.13	G													
			Gate Posts	2.16	G													
			Gate Hardware and Accessories	2.18	G													
			Padlocks	2.23	G													
			Wire Ties	2.20	G													
			SD-08 Manufacturer’s Instructions															
			Hardware Assembly	1.3	G													
			Accessories	1.3	G													
		32 92 19	SD-03 Product Data															
			Wood cellulose fiber mulch	2.5.3														
			Fertilizer	2.4														
			SD-06 Test Reports															
			Topsoil composition tests	2.2.3														
			SD-07 Certificates															
			seed	2.1														
			SD-08 Manufacturer’s Instructions															
			Erosion Control Materials	2.7														
		33 05 23.13	SD-01 Preconstruction Submittals															

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		33 05 23.13	Statement of Qualifications and	1.4	G													
			Records															
			SD-02 Shop Drawings															
			Record Drawings	3.3	G													
			SD-03 Product Data															
			Polyethylene Pipe	1.4	G													
			Drilling Fluids	1.4	G													
			Additives	1.4	G													
			Mixtures	1.4	G													
			SD-05 Design Data															
			Material Safety Data Sheets	1.4	G													
			SD-06 Test Reports															
			Soil Test Data	1.4	G													
			SD-07 Certificates															
			Drill Rod	2.1.1	G													
			SD-11 Closeout Submittals															
			Complete Work Logs of Guided	3.3	G													
			Directional Drill Operations															
		33 40 00	SD-01 Preconstruction Submittals															
			Sample Video Recordings	3.1.1.1	G													
			SD-03 Product Data															
			Placing Pipe	3.4														
			SD-04 Samples															
			Pipe for Culverts and Storm	2.1														
			Drains															
			SD-06 Test Reports															

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		33 40 00	Documentation and Reports	3.1.1.1	G													
			SD-07 Certificates															
			NASSCO's Pipeline Assessment	3.1.1.1	G													
			and Certification Program															
			Pipeline Testing	3.9	G													
			Determination of Density	3.8.5	G													
			Structure, Frame and Cover for	2.3.5	G													
			Gratings															
		33 71 02	SD-02 Shop Drawings															
			Precast underground structures	1.4.1	G													
			SD-03 Product Data															
			Live end caps	2.6	G													
			Precast concrete structures	2.11.2.1	G													
			Sealing Material	2.11.2.4														
			Pulling-In Irons	3.5.3														
			Manhole frames and covers	2.11.3	G													
			Handhole frames and covers	2.11.4	G													
			Frames and Covers for Airfield	2.11.5	G													
			Facilities															
			Ductile Iron Frames and Covers	2.11.6	G													
			for Airfield Facilities															
			Cable supports	2.12	G													
			SD-06 Test Reports															
			Field Acceptance Checks and	3.17.1	G													
			Tests															
			Arc-proofing test	2.14.1	G													

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		33 71 02	Cable Installation Plan and	3.3	G													
			Procedure															
			SD-07 Certificates															
			Cable splicer/terminator	1.4.2	G													
			Cable Installer Qualifications	1.4.3	G													
			Certificate of Conformance	1.4.4	G													
		33 82 00	SD-02 Shop Drawings															
			Telecommunications Outside	1.6.1.1	G													
			Plant															
			Telecommunications Entrance	1.6.1.2	G													
			Facility Drawings															
			SD-03 Product Data															
			Wire and cable	2.6	G													
			Cable splices, and connectors	2.4	G													
			Closures	2.3	G													
			Building protector assemblies	2.2.1	G													
			Protector modules	2.2.2	G													
			Cross-connect terminal cabinets		G													
			SD-06 Test Reports															
			Pre-installation tests	3.4.1	G													
			Acceptance tests	3.4.2	G													
			Outside Plant Test Plan	1.6.3	G													
			SD-07 Certificates															
			Telecommunications Contractor	1.6.2.1	G													
			Key Personnel	1.6.2.2	G													
			Manufacturer's Qualifications	1.6.2.3	G													

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		33 82 00	SD-08 Manufacturer's Instructions															
			Building protector assembly	2.2.1	G													
			installation															
			Cable tensions	3.1.6.1	G													
			Fiber Optic Splices	3.1.7.2	G													
			SD-09 Manufacturer's Field															
			Reports															
			Factory Reel Test Data	2.13.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Telecommunications outside	1.6.1.1	G													
			plant (OSP)															
			SD-11 Closeout Submittals															
			Record Documentation	1.8.1	G													
		34 43 00.00 20	SD-02 Shop Drawings															
			Approach lighting	3.17	G													
			lighting fixture installation	3.10.5	G													
			Wind cone	2.6	G													
			Wave-Off system	2.18	G													
			SPAWAR Design Package	2.16	G													
			SD-03 Product Data															
			Control cable	2.4.3.4	G													
			Series airfield lighting cable	2.4.3.1	G													
			Wind cone	2.6	G													
			Isolating transformers	2.8.1	G													
			Constant current regulators	2.11	G													

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		34 43 00.00 20	runway and taxiway lighting	2.20	G													
			light bases	2.9	G													
			Frangible couplings	2.3.6	G													
			FAA Type P-606 sealant	2.10.1	G													
			FAA Type L-823 connectors	2.4.3.2	G													
			FAA Type L-823 connectors	2.21	G													
			Pilot relay panel	2.14	G													
			Control transfer panel	2.15	G													
			Control panel (ALCMS)	2.16	G													
			Sequenced flashing light system	2.19.2	G													
			Wave-Off system	2.18	G													
			SD-06 Test Reports															
			Counterpoise system test	3.18.4	G													
			High Voltage Test	3.18.6.2														
			SD-07 Certificates															
			Installer Qualifications	1.4.3	G													
			Construction Outage Plan	1.4.4	G													
			SD-10 Operation and Maintenance															
			Data															
			Constant current regulators	2.11	G													
			Sequenced flashing light system	2.19.2	G													
			Wave-Off system	2.18	G													

SECTION 01 33 29

SUSTAINABILITY REPORTING
02/15

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 189.1	(2014; Errata 1-2 2015) Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

U.S. DEPARTMENT OF ENERGY (DOE)

ISWG Guiding Principles	(2008) High Performance and Sustainable Buildings Guidance

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

40 CFR 247	Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2 SUMMARY

This specification includes general requirements and procedures for this project to be constructed and documented per the federally mandated "Guiding Principles" (GP), Third Party Certification (TPC) requirements (if applicable), UFC 1-200-02, High Performance and Sustainable Building Requirements, and other requirements identified in this specification.

1.3 DOCUMENTATION REQUIREMENTS

Incorporate each of the following ISWG Guiding Principles Requirements into project construction; and provide documentation that proves compliance with each listed requirement. Items below are organized according to the ISWG Guiding Principles.

1.3.1 Energy Efficient Equipment

Provide only energy-using equipment that is Energy Star rated, or has the Federal Energy Management Program (FEMP) recommended efficiency. Where Energy Star or FEMP recommendations have not been established, provide most efficient equipment available. Provide only energy using equipment that meets FEMP requirements for low standby power consumption. Energy efficient equipment can be found at: http://www1.eere.energy.gov/femp/ and http://www.energystar.gov/. Provide the following documentation:

Proof that equipment is labeled energy efficient and complies with the cited requirements.

1.3.2 Reduce Volatile Organic Compounds (VOC) (Low Emitting Materials)

Provide materials and products with low pollutant emissions, including composite wood products, adhesives, sealants, interior paints and finishes, carpet systems, and furnishings. Meeting the requirements of ASHRAE 189.1 Sections 8.4.2 (Prescriptive Option: Materials) or Section 8.5.2 (Performance Option: Materials) demonstrates compliance. Insulation products must meet the requirements of Section 8.5.2 (Performance Option: Materials). Provide the following documentation:

a. Demonstrate that materials do not exceed maximum VOC emissions of cited standards. VOC averaging is allowed where coatings are subject to human contact or harsh environmental conditions.

1.3.3 Environmentally Preferred Products

Use products designated for Federal procurement to meet environmentally preferred requirements. Provide the following documentation:

Provide list of environmentally preferable products used on this project that meet the requirements of UFC 1-200-02.

1.3.4 Recycled Content

Provide materials on this project with aggregated total recycled content equal to or greater than 10 percent. In addition, comply with 40 CFR 247. Refer to for assistance identifying products cited in 40 CFR 247. Provide the following documentation:

a. Total amount of recycled content contained in building materials as a percentage of total cost of all building materials on the project (mechanical, electrical, and plumbing components, fire protection equipment and transportation are excluded).

1.3.5 Waste Material Management (Recycling - Construction)

Divert construction debris from landfill disposal where markets or on-site recycling exists whenever possible. Provide the following documentation:

a. Documentation showing total amount of construction debris diverted from landfill as a percentage of all construction debris on the project.

b. Include project's Construction Waste Management Plan and all dumpster haul tickets.

1.3.6 Ozone Depleting Substances

The use of CFC-based refrigerants in HVAC&R systems is prohibited. Eliminate the use of ozone depleting substances (CFC's, HCFCs, or Halons) during and after construction where alternative environmentally preferable products are available, taking into account lifecycle impacts. Meet the requirements of ASHRAE 189.1 Section 9.3.3 Refrigerants for no CFC-based refrigerants in heating ventilation, air conditioning and refrigeration systems (except for fire suppression system requirements, covered elsewhere in this specification). Provide the following documentation:

a. MSDS sheets for all refrigerants provided

b. Products that meet the criteria of U.S. EPA Significant New Alternatives Policy, available at http://www.epa.gov/ozone/snap/index.html.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS
11/15

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.34	(2001; R 2012) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE A10.44	(2014) Control of Energy Sources (Lockout/Tagout) for Construction and Demolition Operations
ASSE/SAFE Z244.1	(2003; R 2014) Control of Hazardous Energy Lockout/Tagout and Alternative Methods
ASSE/SAFE Z359.0	(2012) Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ASSE/SAFE Z359.1	(2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
ASSE/SAFE Z359.11	(2014) Safety Requirements for Full Body Harnesses
ASSE/SAFE Z359.12	(2009) Connecting Components for Personal Fall Arrest Systems
ASSE/SAFE Z359.13	(2013) Personal Energy Absorbers and Energy Absorbing Lanyards
ASSE/SAFE Z359.14	(2014) Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems
ASSE/SAFE Z359.15	(2014) Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems
ASSE/SAFE Z359.2	(2007) Minimum Requirements for a Comprehensive Managed Fall Protection Program
ASSE/SAFE Z359.3	(2007) Safety Requirements for Positioning and Travel Restraint Systems
ASSE/SAFE Z359.4	(2013) Safety Requirements for Assisted-Rescue and Self-Rescue Systems,

Subsystems and Components

ASSE/SAFE Z359.6 (2009) Specifications and Design Requirements for Active Fall Protection Systems

ASSE/SAFE Z359.7 (2011) Qualification and Verification Testing of Fall Protection Products

ASME INTERNATIONAL (ASME)

ASME B30.20 (2013; INT Oct 2010 - May 2012) Below-the-Hook Lifting Devices

ASME B30.22 (2010) Articulating Boom Cranes

ASME B30.26 (2015; INT Jun 2010 - Jun 2014) Rigging Hardware

ASME B30.3 (2012) Tower Cranes

ASME B30.5 (2014) Mobile and Locomotive Cranes

ASME B30.8 (2010) Floating Cranes and Floating Derricks

ASME B30.9 (2014; INT Feb 2011 - Nov 2013) Slings

ASTM INTERNATIONAL (ASTM)

ASTM F855 (2015) Standard Specifications for Temporary Protective Grounds to Be Used on De-energized Electric Power Lines and Equipment

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1048 (2003) Guide for Protective Grounding of Power Lines

IEEE C2 (2012; Errata 2012; INT 1-4 2012; INT 5-7 2013; INT 8-10 2014; INT 11 2015) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA Z535.2 (2011) Environmental and Facility Safety Signs

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (2013) Standard for Portable Fire Extinguishers

NFPA 241 (2013; Errata 2015) Standard for Safeguarding Construction,Alteration, and Demolition Operations

NFPA 51B (2014) Standard for 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; ERTA 1 2015) Standard for Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

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

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 1910.333	Selection and Use of Work Practices
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1915.89	Control of Hazardous Energy (Lockout/Tags-Plus)
29 CFR 1919	Gear Certification
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.1400	Cranes and Derricks in Construction
29 CFR 1926.16	Rules of Construction
29 CFR 1926.450	Scaffolds
29 CFR 1926.500	Fall Protection
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

1.2 DEFINITIONS

1.2.1 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working conditions that are dangerous to personnel, and who has authorization to take prompt corrective measures with regards to such hazards.

1.2.2 Competent Person, Confined Space

The CP, Confined Space, is a person meeting the competent person requirements as defined EM 385-1-1 Appendix Q, with thorough knowledge of OSHA's Confined Space Standard, 29 CFR 1910.146, and designated in writing to be responsible for the immediate supervision, implementation and monitoring of the confined space program, who through training, knowledge and experience in confined space entry is capable of identifying, evaluating and addressing existing and potential confined space hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.3 Competent Person, Cranes and Rigging

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.4 Competent Person, Excavation/Trenching

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in excavation/trenching is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.5 Competent Person, Fall Protection

The CP, Fall Protection, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and in accordance with ASSE/SAFE Z359.0, who has been designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.6 Competent Person, Scaffolding

The CP, Scaffolding is a person meeting the competent person requirements in EM 385-1-1 Appendix Q, and designated in writing by the employer to be

responsible for immediate supervising, implementing and monitoring of the scaffolding program. The CP for Scaffolding has enough training, knowledge and experience in scaffolding to correctly identify, evaluate and address existing and potential hazards and also has the authority to take prompt corrective measures with regard to these hazards. CP qualifications must be documented and include experience on the specific scaffolding systems/types being used, assessment of the base material that the scaffold will be erected upon, load calculations for materials and personnel, and erection and dismantling. The CP for scaffolding must have a documented, minimum of 8-hours of scaffold training to include training on the specific type of scaffold being used (e.g. mast-climbing, adjustable, tubular frame), in accordance with EM 385-1-1 Section 22.B.02.

1.2.7 Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

1.2.8 High Risk Activities

High Risk Activities are activities that involve work at heights, crane and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

1.2.9 High Visibility Accident

A High Visibility Accident is any mishap which may generate publicity or high visibility.

1.2.10 Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or horizontally move a load).

1.2.11 Medical Treatment

Medical Treatment is treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

1.2.12 Near Miss

A Near Miss is a mishap resulting in no personal injury and zero property damage, but given a shift in time or position, damage or injury may have occurred (e.g., a worker falls off a scaffold and is not injured; a crane swings around to move the load and narrowly misses a parked vehicle).

1.2.13 Operating Envelope

The Operating Envelope is the area surrounding any crane or load handling equipment. Inside this "envelope" is the crane, the operator, riggers and crane walkers, other personnel involved in the operation, rigging gear between the hook, the load, the crane's supporting structure (i.e. ground or rail), the load's rigging path, the lift and rigging procedure.

1.2.14 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

1.2.15 Qualified Person, Fall Protection (QP for FP)

A QP for FP is a person meeting the requirements of EM 385-1-1 Appendix Q, and ASSE/SAFE Z359.0, with a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, and evaluating and specifying fall protection and rescue systems.

1.2.16 Recordable Injuries or Illnesses

Recordable Injuries or Illnesses are any work-related injury or illness that results in:

a. Death, regardless of the time between the injury and death, or the length of the illness;

b. Days away from work (any time lost after day of injury/illness onset);

c. Restricted work;

d. Transfer to another job;

e. Medical treatment beyond first aid;

f. Loss of consciousness; or

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

1.2.17 USACE Property and Equipment

Interpret "USACE" property and equipment specified in USACE EM 385-1-1 as Government property and equipment.

1.2.18 Load Handling Equipment (LHE) Accident or Load Handling Equipment Mishap

A LHE 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 occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, or roll over). Document any mishap that meets the criteria described in the Contractor Significant Incident Report (CSIR) using the NAVFAC prescribed Navy Crane Center (NCC) form.

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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Reports; G

LHE Inspection Reports

SD-07 Certificates

Contractor Safety Self-Evaluation Checklist

Crane Operators/Riggers

Standard Lift Plan; G

Critical Lift Plan ; G

Naval Architecture Analysis; G

Activity Hazard Analysis (AHA)

Confined Space Entry Permit

Hot Work Permit

Certificate of Compliance

Third Party Certification of Barge-Mounted Mobile Cranes

License Certificates

Radiography Operation Planning Work Sheet; G

1.4 MONTHLY EXPOSURE REPORTS

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.

1.5 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 retention of up to 10 percent of the voucher.

1.6 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 the following 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.

1.6.1 Subcontractor Safety Requirements

For this contract, neither Contractor nor any subcontractor may enter into contract with any subcontractor that fails to meet the following requirements. The term subcontractor in this and the following paragraphs means any entity holding a contract with the Contractor or with a subcontractor at any tier.

1.6.1.1 Experience Modification Rate (EMR)

Subcontractors on this contract must have an effective EMR less than or equal to 1.10, as computed by the National Council on Compensation Insurance (NCCI) or if not available, as computed by the state agency's rating bureau in the state where the subcontractor is registered, when entering into a subcontract agreement with the Prime Contractor or a subcontractor at any tier. The Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable EMR range cannot be achieved. Relaxation of the EMR range will only be considered for approval on a case-by-case basis for special conditions and must not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) must collect and maintain the certified EMR ratings for all subcontractors on the project and make them available to the Government at the Government's request.

1.6.1.2 OSHA Days Away from Work, Restricted Duty, or Job Transfer (DART) Rate

Subcontractors on this contract must have a DART rate, calculated from the most recent, complete calendar year, less than or equal to 3.4 when entering into a subcontract agreement with the Prime Contractor or a

subcontractor at any tier. The OSHA Dart Rate is calculated using the following formula:

(N/EH) x 200,000

where:

N = number of injuries and illnesses with days away, restricted work, or job transfer

EH = total hours worked by all employees during most recent, complete calendar year

200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year)

The Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable OSHA Dart rate range cannot be achieved for a particular subcontractor. Relaxation of the OSHA DART rate range will only be considered for approval on a case-by-case basis for special conditions and must not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) must collect and maintain self-certified OSHA DART rates for all subcontractors on the project and make them available to the Government at the Government's request.

1.7 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

1.7.1 Personnel Qualifications

1.7.1.1 Site Safety and Health Officer (SSHO)

Provide an SSHO that meets the requirements of EM 385-1-1 Section 1. The SSHO must ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one (1) person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Alternate SSHO must 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 and Alternate SSHO must have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated sub-paragraphs.

If the SSHO is off-site for a period longer than 24 hours, an equally-qualified alternate SSHO must be provided and must fulfill the same roles and responsibilities as the primary SSHO. When the SSHO is temporarily (up to 24 hours) off-site, a Designated Representative (DR), as identified in the AHA may be used in lieu of an Alternate SSHO, and must be on the project site at all times when work is being performed. Note that the DR is a collateral duty safety position, with safety duties in addition to their full time occupation.

1.7.1.2 Contractor Quality Control (QC) Manager:

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

1.7.1.3 Competent Person Qualifications

Provide Competent Persons in accordance with EM 385-1-1, Appendix Q and herein. Competent Persons for high risk activities include confined space, cranes and rigging, excavation/trenching, fall protection, and electrical work. The CP for these activities must be designated in writing, and meet the requirements for the specific activity (i.e. competent person, fall protection).

The Competent Person identified in the Contractor's Safety and Health Program and accepted Accident Prevention Plan, must 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 the Contracting Officer for information in consultation with the Safety Office.

1.7.1.3.1 Competent Person for Confined Space Entry

Provide a Confined Space (CP) Competent Person who meets the requirements of EM 385-1-1, Appendix Q, and herein. The CP for Confined Space Entry must supervise the entry into each confined space.

1.7.1.3.2 Competent Person for Fall Protection

Provide a Competent Person for Fall Protection who meets the requirements of EM 385-1-1, Section 21.C.04 and herein.

1.7.1.4 Qualified Trainer Requirements

Individuals qualified to instruct the 40 hour contract safety awareness course, or portions thereof, must meet the definition of a Competent Person Trainer, and, at a minimum, possess a working knowledge of the following subject areas: EM 385-1-1, Electrical Standards,Lockout/Tagout, Fall Protection, Confined Space Entry for Construction; Excavation, Trenching and Soil Mechanics, and Scaffolds in accordance with 29 CFR 1926.450, Subpart L.

Instructors are required to:

a. Prepare class presentations that cover construction-related safety requirements.

b. Ensure that all attendees attend all sessions by using a class roster signed daily by each attendee. Maintain copies of the roster for at least five (5) years. This is a certification class and must be attended 100 percent. In cases of emergency where an attendee cannot make it to a session, the attendee can make it up in another class session for the same subject.

c. Update training course materials whenever an update of the EM 385-1-1 becomes available.

d. Provide a written exam of at least 50 questions. Students are required to answer 80 percent correctly to pass.

e. Request, review and incorporate student feedback into a continuous course improvement program.

1.7.1.5 Crane Operators/Riggers

Provide Operators meeting the requirements in EM 385-1-1, Section 15.B for Riggers and Section 16.B for Crane Operators. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacities of 50,000 pounds or greater, designate crane operators qualified by a source that qualifies crane operators (i.e., union, a government agency, or an organization that tests and qualifies crane operators). Provide proof of current qualification.

1.7.2 Personnel Duties

1.7.2.1 Duties of the Site Safety and Health Officer (SSHO)

The SSHO must:

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 report.

b. Conduct mishap investigations and complete required accident reports. Report mishaps and near misses.

c. Use OSHA's Form 300 to log work-related injuries and illnesses occurring on the project site for Prime Contractors and subcontractors. Post and maintain the Form 300 on the site Safety Bulletin Board.

d. Maintain applicable safety reference material on the job site.

e. Attend the pre-construction conference, pre-work meetings including preparatory meetings, and periodic in-progress meetings.

f. Review the APP and AHAs for compliance with EM 385-1-1, and approve, sign, implement and enforce them.

g. Establish a Safety and Occupational Health (SOH) Deficiency Tracking System that lists and monitors outstanding deficiencies until resolution.

h. Ensure subcontractor compliance with safety and health requirements.

i. Maintain a list of hazardous chemicals on site and their material Safety Data Sheets (SDS).

j. Maintain a weekly list of high hazard activities involving energy, equipment, excavation, entry into confined space, and elevation, and be prepared to discuss details during QC Meetings.

k. Provide and keep a record of site safety orientation and indoctrination for Contractor employees, subcontractor employees, and site visitors.

Superintendent, QC Manager, and SSHO are subject to dismissal if the above duties are not being effectively carried out. If Superintendent, QC Manager, or SSHO are dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

1.7.3 Meetings

1.7.3.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction conference. This includes the project superintendent, Site Safety and Occupational 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 as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, and Government review of AHAs to preclude project delays.

c. Deficiencies in the submitted APP, identified during the Contracting Officer's review, must be corrected, and the APP re-submitted for review prior to the start of construction. Work is not permitted to begin work until an APP is established that is acceptable to the Contracting Officer.

1.7.3.2 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors on the project location. The SSHO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

1.8 ACCIDENT PREVENTION PLAN (APP)

A qualified person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of EM 385-1-1, Appendix A, and as supplemented herein. Cover all paragraph and subparagraph elements in EM 385-1-1, Appendix A. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP must interface with the Contractor's overall safety and health program referenced in the APP in the applicable APP element, and made site-specific. Describe the methods to evaluate past safety performance of potential subcontractors in the selection process. Also, describe innovative methods used to ensure and monitor safe work practices of subcontractors. 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 must be signed by an officer of the firm (Prime Contractor senior person), the individual preparing the APP, the on-site superintendent, the designated SSHO, the Contractor Quality Control Manager, and any designated Certified Safety Professional (CSP) or Certified Health Physicist (CIH). The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

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 reviewed and 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 is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified. Continuously review and amend the APP, as necessary, throughout the life of the contract. Changes to the accepted APP must be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. 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 and 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.

1.8.1 Names and Qualifications

Provide plans in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

a. Names and qualifications (resumes including education, training, experience and certifications) of 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. 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; and personal protective equipment and clothing to include selection, use and maintenance.

1.8.2 Plans

Provide plans in the APP in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

1.8.2.1 Confined Space Entry Plan

Develop a confined or enclosed space entry plan in accordance with 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.)

1.8.2.2 Standard Lift Plan (SLP)

Plan lifts to avoid situations where the operator cannot maintain safe control of the lift. Prepare a written SLP in accordance with EM 385-1-1, Section 16.A.03, using Form 16-2 for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed and accepted by all personnel involved in the lift in conjunction with the associated AHA. Signature on the AHA constitutes acceptance of the plan. Maintain the SLP on the LHE for the current lift(s) being made. Maintain historical SLPs for a minimum of 3 months.

1.8.2.3 Critical Lift Plan - Crane or Load Handling Equipment

Provide a Critical Lift Plan as required by EM 385-1-1, Section 16.H.01, using Form 16-3. Critical lifts require detailed planning and additional or unusual safety precautions. Develop and submit a critical lift plan to the Contracting Officer 30 calendar days prior to critical lift. Comply with load testing requirements in accordance with EM 385-1-1, Section 16.F.03.

In addition to the requirements of EM 385-1-1, Section 16.H.02, the critical lift plan must include the following:

a. For lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400 and EM 385-1-1, Section 16.T.

b. For barge mounted mobile cranes, provide a Naval Architecture Analysis and include an LHE Manufacturer's Floating Service Load Chart in accordance with the criteria from the selected standard in EM 385-1-1, Section 16.L.02. The Floating Service Load Chart must provide a table of rated load versus boom angle and radius. The Floating Service Load Chart must also provide the maximum allowable machine list and trim associated with the tabular loads and radii provided. If the Manufacturer's Floating Service Load Chart is not available, a floating service load chart may be developed and provided by a qualified Registered Professional Engineer (RPE), competent in the field of floating cranes. The Load Chart must be in accordance with the criteria from the selected standard in EM 385-1-1, Section 16.L; provide a table of rated load versus boom angle and radius; provide the maximum allowable machine list and machine trim associated with the tabular loads and radii provided; and be stamped by a RPE qualified and competent in the field of floating cranes. The RPE, competent in the field of floating cranes must stamp and certify (sign) that the Naval Architectural Analysis (NAA) meets the requirements of EM 385-1-1, Section 16.L.03.

c. Multi-purpose machines, material handling equipment, and construction equipment used to lift loads that are suspended by rigging gear, require proof of authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. Demonstrate that the operator is properly trained and that the equipment is properly configured to make such lifts and is equipped with a load chart.

1.8.2.4 Fall Protection and Prevention (FP&P) Plan

The plan must comply with the requirements of EM 385-1-1, Section 21.D and ASSE/SAFE Z359.2, be site specific, and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A competent person or qualified person for fall protection must prepare and sign the plan documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, roles and responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Review and revise, as necessary, the Fall Protection and Prevention Plan documentation as conditions change, but at a minimum 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 Plan documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Plan documentation in the Accident Prevention Plan (APP).

1.8.2.5 Rescue and Evacuation Plan

Provide a Rescue and Evacuation Plan in accordance with EM 385-1-1 Section 21.N and ASSE/SAFE Z359.2, and include in the FP&P Plan and as part of the APP. 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.

1.8.2.6 Hazardous Energy Control Program (HECP)

Develop a HECP in accordance with EM 385-1-1 Section 12, 29 CFR 1910.147, 29 CFR 1910.333, 29 CFR 1915.89, ASSE/SAFE Z244.1, and ASSE/SAFE A10.44. Submit this HECP as part of the Accident Prevention Plan (APP). Conduct a preparatory meeting and inspection with all effected personnel to coordinate all HECP activities. Document this meeting and inspection in accordance with EM 385-1-1, Section 12.A.02. Ensure that each employee is familiar with and complies with these procedures.

1.8.2.7 Excavation Plan

Identify the safety and health aspects of excavation, and provide and prepare the plan in accordance with EM 385-1-1, Section 25.A and Section 31 23 00.00 20 EXCAVATION AND FILL.

1.8.2.8 Occupant Protection Plan

Identify the safety and health aspects of lead-based paint removal, prepared in accordance with Section 02 82 33.13 20 REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD.

1.8.2.9 Asbestos Hazard Abatement Plan

Identify the safety and health aspects of asbestos work, and prepare in accordance with Section 02 82 16.00 20 ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS.

1.8.2.10 Site Demolition Plan

Identify the safety and health aspects, and prepare in accordance with Section 02 41 00 DEMOLITION AND DECONSTRUCTION and referenced sources. Include engineering survey as applicable.

1.9 ACTIVITY HAZARD ANALYSIS (AHA)

Before beginning each activity, task or Definable Feature of Work (DFOW) involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Format the AHA in accordance with EM 385-1-1, Section 1 or as directed by the Contracting Officer. Submit the AHA for review at least 15 working days prior to the start of each activity task, or DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials, personnel and the control measures to be implemented.

AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

1.9.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

1.9.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOW must review the AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

1.10 DISPLAY OF SAFETY INFORMATION

1.10.1 Safety Bulletin Board

Within one calendar day(s) 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, may 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.

1.10.2 Safety and Occupational Health (SOH) Deficiency Tracking System

Establish a SOH deficiency tracking system that lists and monitors the status of SOH deficiencies in chronological order. Use the tracking system to evaluate the effectiveness of the APP. A monthly evaluation of the data must be discussed in the QC or SOH meeting with everyone on the project. The list must be posted on the project bulletin board and updated daily, and provide the following information:

a. Date deficiency identified;

b. Description of deficiency;

c. Name of person responsible for correcting deficiency;

d. Projected resolution date;

e. Date actually resolved.

1.11 SITE SAFETY REFERENCE MATERIALS

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

1.12 EMERGENCY MEDICAL TREATMENT

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

1.13 NOTIFICATIONS and REPORTS

1.13.1 Mishap Notification

Notify the Contracting Officer as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as defined in EM 385-1-1 Appendix Q, any report of injury, illness, load handling equipment (LHE) or rigging mishaps, or any property damage. The Contractor is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law enforcement, and regulatory agencies. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

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 (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the Government's investigation(s) of any mishap.

1.13.2 Accident Reports

a. Conduct an accident investigation for recordable injuries and illnesses, property damage, 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: For Navy Projects, complete the applicable documentation in NAVFAC Contractor Incident Reporting System (CIRS), and electronically submit via the NAVFAC Enterprise Safety Applications Management System (ESAMS). Near miss reports are considered positive and proactive Contractor safety management actions.

c. Conduct an accident investigation for any load handling equipment accident (including rigging gear accidents) to establish the root cause(s) of the accident. Complete the LHE 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.

1.13.3 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

1.13.4 Certificate of Compliance and Pre-lift Plan/Checklist for LHE and Rigging

Provide a FORM 16-1 Certificate of Compliance for LHE entering an activity under this contract and in accordance with EM 385-1-1. Post certifications on the crane.

Develop a Standard Lift Plan (SLP) in accordance with EM 385-1-1, Section 16.H.03 using Form 16-2 Standard Pre-Lift Crane Plan/Checklist for each lift planned. Submit SLP to the Contracting Officer for approval within 15 calendar days in advance of planned lift.

1.13.5 Third Party Certification of Barge-Mounted Mobile Cranes

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

1.14 HOT WORK

1.14.1 Permit and Personnel Requirements

Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting) or operating other flame-producing/spark producing devices, from the Fire Division. 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 two 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged, and contain an approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch must be trained in accordance with NFPA 51B and remain on-site for a minimum of one hour after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Division phone number. REPORT ANY FIRE, NO MATTER HOW SMALL, TO THE RESPONSIBLE FIRE DIVISION IMMEDIATELY.

1.14.2 Work Around Flammable Materials

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

Whenever these materials, except beryllium and chromium (VI), are encountered in indoor operations, local mechanical exhaust ventilation systems that are sufficient to reduce and maintain personal exposures to within acceptable limits must be used and maintained in accordance with manufacturer's instruction and supplemented by exceptions noted in EM 385-1-1, Section 06.H

1.15 RADIATION SAFETY REQUIREMENTS

Submit License Certificates, employee training records, and Leak Test Reports for radiation materials and equipment to the Contracting Officer and Radiation Safety Office (RSO), and Contracting Oversight Technician (COT) for all specialized and licensed material and equipment proposed for use on the construction project. Maintain on-site records whenever licensed radiological materials or ionizing equipment are on government property.

Protect workers from radiation exposure in accordance with 10 CFR 20, ensuring any personnel exposures are maintained As Low As Reasonably Achievable.

1.15.1 Radiography Operation Planning Work Sheet

Submit a Radiography Operation Planning Work Sheet to Contracting Officer 14 days prior to commencement of operations involving radioactive materials or radiation generating devices. The Contracting Officer and COT will review this worksheet and submit questions and comments.

Contractors must use primary dosimeters process by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory.

1.15.2 Site Access and Security

Coordinate site access and security requirements with the Contracting Officer and COT for all radiological materials and equipment containing ionizing radiation that are proposed for use on a government facility. The Navy COT or authorized representative will meet the Contractor at a designated location, ensure safety of the materials being transported, and will escort the Contractor to the job site and return upon completion of the work.

Provide a copy of all calibration records, and utilization records to the COT for radiological operations performed on the site.

1.15.3 Loss or Release and Unplanned Personnel Exposure

Loss or release of radioactive materials, and unplanned personnel exposures must be reported immediately to the Contracting Officer, RSO, and Base Security Department Emergency Number.

1.15.4 Site Demarcation and Barricade

Properly demark and barricade an area surrounding radiological operations to preclude personnel entrance, in accordance with EM 385-1-1, Nuclear Regulatory Commission, and Applicable State regulations and license requirements, and in accordance with requirements established in the accepted Radiography Operation Planning Work Sheet.

Do not close or obstruct streets, walks, and other facilities occupied and used by the Government without written permission from the Contracting Officer.

1.15.5 Security of Material and Equipment

Properly secure the radiological material and ionizing radiation equipment at all times, including keeping the devices in a properly marked and locked container, and secondarily locking the container to a secure point in the Contractor's vehicle or other approved storage location during transportation and while not in use. While in use, maintain a continuous visual observation on the radiological material and ionizing radiation equipment. In instances where radiography is scheduled near or adjacent to buildings or areas having limited access or one-way doors, make no assumptions 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, position a fully instructed employee inside the building or area to prevent exiting while external radiographic operations are in process.

1.15.6 Transportation of Material

Comply with 49 CFR 173 for Transportation of Regulated Amounts of Radioactive Material. Notify Local Fire authorities and the site Radiation Safety officer (RSO) of any Radioactive Material use.

1.15.7 Schedule for Exposure or Unshielding

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

1.15.8 Transmitter Requirements

Adhere to the base policy concerning the use of transmitters, such as radios and cell phones. Obey Emissions control (EMCON) restrictions.

1.16 CONFINED SPACE ENTRY REQUIREMENTS.

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

1.16.1 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. Comply with EM 385-1-1, Section 34 for entry procedures. Hazards pertaining to the space must be reviewed with each employee during review of the AHA.

1.16.2 Forced Air Ventilation

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.

1.16.3 Sewer Wet Wells

Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

1.16.4 Rescue Procedures and Coordination with Local Emergency Responders

Develop and implement an on-site rescue and recovery plan and procedures. The rescue plan must not rely on local emergency responders for rescue from a confined space.

1.17 DIVE SAFETY REQUIREMENTS

Develop a Dive Operations Plan, AHA, emergency management plan, and personnel list that includes qualifications, for each separate diving operation. Submit these documents to the District Dive Coordinator (DDC) for review and acceptance at least 15 working days prior to commencement of diving operations. These documents must be at the diving location at all times. Provide each of these documents as a part of the project file.

1.18 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.

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 for confined spaces must comply with NEMA Z535.2. 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" must be red and readable from 5 feet.

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity 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 worn or carried/available on each person. Mandatory PPE includes:

a. Hard Hat

b. Long Pants

c. Appropriate Safety Shoes

d. Appropriate Class Reflective Vests

3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. An employee check-in/check-out communication procedure must be developed to ensure employee safety.

3.1.2 Hazardous Material Use

Each hazardous material must receive approval from the Contracting Office 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.

3.1.3 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 EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint, and hexavalent chromium, 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 base.

3.1.4 Unforeseen Hazardous Material

Contract documents identify materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, 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 8 days in advance. As a minimum, the request must 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.

3.3 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Provide and operate a Hazardous Energy Control Program (HECP) in accordance with EM 385-1-1 Section 12, 29 CFR 1910.333, 29 CFR 1915.89, and paragraph HAZARDOUS ENERGY CONTROL PROGRAM (HECP).

3.4 FALL PROTECTION PROGRAM

Establish a fall protection program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify roles and 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 in accordance with ASSE/SAFE Z359.2 and EM 385-1-1, Sections 21.A and 21.D.

3.4.1 Training

Institute a fall protection training program. As part of the Fall Protection 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 EM 385-1-1, Section 21.C. Document training and practical application of the competent person in accordance with EM 385-1-1, Section 21.C.04 and ASSE/SAFE Z359.2 in the AHA.

3.4.2 Fall Protection Equipment and Systems

Enforce use of personal fall protection equipment and systems designated (to include fall arrest, restraint, and positioning) for each specific work activity in the Site Specific Fall Protection and Prevention Plan and 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.

Provide personal fall protection equipment, systems, subsystems, and components that comply with EM 385-1-1 Section 21.I, 29 CFR 1926.500 Subpart M,ASSE/SAFE Z359.0, ASSE/SAFE Z359.1, ASSE/SAFE Z359.2, ASSE/SAFE Z359.3, ASSE/SAFE Z359.4, ASSE/SAFE Z359.6, ASSE/SAFE Z359.7, ASSE/SAFE Z359.11, ASSE/SAFE Z359.12, ASSE/SAFE Z359.13, ASSE/SAFE Z359.14, and ASSE/SAFE Z359.15.

3.4.2.1 Additional Personal Fall Protection

In addition to the required fall protection systems, other protection such as safety skiffs, personal floatation devices, and life rings, are required when working above or next to water in accordance with EM 385-1-1, Sections 21.O through 21.O.06. Personal fall protection systems and equipment are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall protection systems are required when operating other equipment such as scissor lifts. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, travel, or while performing work.

3.4.2.2 Personal Fall Protection Harnesses

Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. The use of body belts is not acceptable. Harnesses must 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. Snap hooks and carabiners must be self-closing and self-locking, capable of being opened only by at least two consecutive deliberate actions and have a minimum gate strength of 3,600 lbs in all directions. Use webbing, straps, and ropes made of synthetic fiber. The maximum free fall distance when using fall arrest equipment must not exceed 6 feet, unless the proper energy absorbing lanyard is used. Always take into consideration the total fall distance and any swinging of the worker (pendulum-like motion), that can occur during a fall, when attaching a person to a fall arrest system. All full body harnesses must be equipped with Suspension Trauma Preventers such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance in accordance with EM 385-1-1, Section 21.I.06.

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 a roof having a slope less than or equal to 4:12 (vertical to horizontal), protect personnel from falling by use of personal fall arrest/restraint systems, guardrails, or safety nets. A safety monitoring system is not adequate fall protection and is not authorized. Provide in accordance with 29 CFR 1926.500.

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

b. Steep-Sloped Roofs: Work on a roof having a slope greater than 4:1 (vertical to horizontal) requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also applies to residential or housing type construction.

3.4.4 Horizontal Lifelines (HLL)

Provide HLL in accordance with EM 385-1-1, Section 21.I.08.d.2. Commercially manufactured horizontal lifelines (HLL) must be designed, installed, certified and used, under the supervision of a qualified person, for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500). The competent person for fall protection may (if deemed appropriate by the qualified person) supervise the assembly, disassembly, use and inspection of the HLL system under the direction of the qualified person. Locally manufactured HLLs are not acceptable unless they are custom designed for limited or site specific applications by a Registered Professional Engineer who is qualified in designing HLL systems.

3.4.5 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with EM 385-1-1, Section 21.F.01 and 29 CFR 1926 Subpart M.

3.4.6 Rescue and Evacuation Plan and 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 or assisted-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). The plan must comply with the requirements of EM 385-1-1, ASSE/SAFE Z359.2, and ASSE/SAFE Z359.4.

3.5 WORK PLATFORMS

3.5.1 Scaffolding

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Comply with the following requirements:

a. Scaffold platforms greater than 20 feet in height must be accessed by use of a scaffold stair system.

b. Ladders commonly provided by scaffold system manufacturers are prohibited for accessing scaffold platforms greater than 20 feet maximum in height.

c. An adequate gate is required.

d. Employees performing scaffold erection and dismantling must be qualified.

e. Scaffold must be capable 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.

f. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.

g. Special care must be given to ensure scaffold systems are not overloaded.

h. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited. The first tie-in must be at the height equal to 4 times the width of the smallest dimension of the scaffold base.

i. Scaffolding other than suspended types must bear on base plates upon wood mudsills (2 in x 10 in x 8 in minimum) or other adequate firm foundation.

j. Scaffold or work platform erectors must have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet.

k. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.5.2 Elevated Aerial Work Platforms (AWPs)

Workers must be anchored to the basket or bucket in accordance with manufacturer's specifications and instructions (anchoring to the boom may only be used when allowed by the manufacturer and permitted by the CP). Lanyards used must be sufficiently short to prohibit worker from climbing out of basket. The climbing of rails is prohibited. Lanyards with built-in shock absorbers are acceptable. Self-retracting devices are not acceptable. Tying off to an adjacent pole or structure is not permitted unless a safe device for 100 percent tie-off is used for the transfer.

Use of AWPs must be operated, inspected, and maintained as specified in the operating manual for the equipment and delineated in the AHA. Operators of AWPs must be designated as qualified operators by the Prime Contractor. Maintain proof of qualifications on site for review and include in the AHA.

3.6 EQUIPMENT

3.6.1 Material Handling Equipment (MHE)

a. Material handling equipment such as forklifts must not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions. Material handling equipment fitted with personnel work platform attachments are prohibited from traveling or positioning while personnel are working on the platform.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions. Material Handling Equipment Operators must be trained in accordance with OSHA 29 CFR 1910, Subpart N.

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

3.6.2 Load Handling Equipment (LHE)

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

b. Notify the Contracting Officer 15 working days in advance of any LHE entering the activity, in accordance with EM 385-1-1, Section 16.A.02, so that necessary quality assurance spot checks can be coordinated. Prior to cranes entering federal activities, a Crane Access Permit must be obtained from the Contracting Officer. A copy of the permitting process will be provided at the Preconstruction Conference. Contractor's operator must remain with the crane during the spot check. Rigging gear must comply with OSHA, ASME B30.9 Standards safety standards.

c. Comply with the LHE 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, ASME B30.8 for floating cranes and floating derricks, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.

e. Under no circumstance must 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 must be alert to this special hazard and follow the requirements of EM 385-1-1 Section 11, and ASME B30.5 or ASME B30.22 as applicable.

g. Do not use 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. Additionally, submit a specific AHA for this work to the Contracting Officer. Ensure the activity and AHA are thoroughly reviewed by all involved personnel.

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 access where accessible areas of the LHE's rotating superstructure poses a risk of striking, pinching or crushing personnel.

m. Maintain inspection records in accordance by EM 385-1-1, Section 16.D, including shift, monthly, and annual inspections, the signature of the person performing the inspection, and the serial number or other identifier of the LHE that was inspected. Records must be available for review by the Contracting Officer.

n. Maintain written reports of operational and load testing in accordance with EM 385-1-1, Section 16.F, listing the load test procedures used along with any repairs or alterations performed on the LHE. Reports must be available for review by the Contracting Officer.

o. Certify that all LHE 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. At wind speeds greater than 20 mph, the operator, rigger and lift supervisor must cease all crane operations, evaluate conditions and determine if the lift may proceed. Base the determination to proceed or not on wind calculations per the manufacturer and a reduction in LHE rated capacity if applicable. Include this maximum wind speed determination as part of the activity hazard analysis plan for that operation.

3.6.3 Machinery and Mechanized Equipment

a. Proof of qualifications for operator must be kept on the project site for review.

b. Manufacture specifications or owner's manual for the equipment must 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.

3.6.4 USE OF EXPLOSIVES

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

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

of explosives.

3.7 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926 and EM 385-1-1.

3.7.1 Utility Locations

Provide a third party, independent, private utility locating company to positively identify underground utilities in the work area in addition to any station locating service and coordinated with the station utility department.

3.7.2 Utility Location Verification

Physically verify underground utility locations, including utility depth, by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system.

3.7.3 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Utilities located within and under concrete slabs or pier structures, bridges, parking areas, and the like, are extremely difficult to identify. Whenever contract work involves chipping, saw cutting, or core drilling through concrete, bituminous asphalt or other impervious surfaces, the existing utility location must be coordinated with station utility departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company must locate utility depth by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

3.8 ELECTRICAL

Perform electrical work in accordance with EM 385-1-1, Appendix A, Sections 11 and 12.

3.8.1 Conduct of Electrical Work

As delineated in EM 385-1-1, electrical work is to be conducted in a de-energized state unless there is no alternative method for accomplishing the work. In those cases obtain an energized work permit from the Contracting Officer. The energized work permit application must be accompanied by the AHA and a summary of why the equipment/circuit needs to be worked energized. 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. Attach temporary grounds in accordance with ASTM F855 and IEEE 1048. 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 is 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 are permitted to enter. When work requires work near energized circuits as defined by NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves and 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. Ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

3.8.2 Qualifications

Electrical work must be performed by QP personnel with verifiable credentials who are familiar with applicable code requirements. Verifiable credentials consist of State, National and Local Certifications or Licenses that a Master or Journeyman Electrician may hold, depending on work being performed, and must be identified in the appropriate AHA. Journeyman/Apprentice ratio must be in accordance with State, Local requirements applicable to where work is being performed.

3.8.3 Arc Flash

Conduct a hazard analysis/arc flash hazard analysis whenever work on or near energized parts greater than 50 volts is necessary, in accordance with NFPA 70E.

All personnel entering the identified arc flash protection boundary must be QPs and properly trained in NFPA 70E requirements and procedures. Unless permitted by NFPA 70E, no Unqualified Person is permitted to approach nearer than the Limited Approach Boundary of energized conductors and circuit parts. Training must be administered by an electrically qualified source and documented.

3.8.4 Grounding

Ground electrical circuits, equipment and enclosures in accordance with NFPA 70 and IEEE C2 to provide a permanent, continuous and effective path to ground unless otherwise noted by EM 385-1-1.

Check grounding circuits to ensure that the circuit between the ground and a grounded power conductor has a resistance low enough to permit sufficient current flow to allow the fuse or circuit breaker to interrupt the current.

3.8.5 Testing

Temporary electrical distribution systems and devices must be inspected, tested and found acceptable for Ground-Fault Circuit Interrupter (GFCI) protection, polarity, ground continuity, and ground resistance before initial use, before use after modification and at least monthly. Monthly inspections and tests must be maintained for each temporary electrical distribution system, and signed by the electrical CP or QP.

-- End of Section --

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.

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Washington, D.C. 20585
Internet: www.eere.energy.gov

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)
HUD User
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Washington, DC 20026-3268
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Fax: 202-708-9981
Internet: http://www.huduser.org

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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

UL ENVIRONMENT (ULE)
2211 Newmarket Parkway, Suite 106
Marietta, GA 30067
Ph: 770-933-0638
Fax: 770-980-0072
E-mail: environment@ul.com
Intertet: http://www.ul.com/environment

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

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

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)
1500 SW First Ave., Suite 870
Portland, OR 97201
Ph: 503-224-3930
Fax: 503-224-3934
E-mail: info@wwpa.org
Internet: http://www.wwpa.org

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

SECTION 01 45 00.00 20

QUALITY CONTROL
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 in the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) 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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. 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.

Basis of Design and Design Intent

Contract Document Review

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: 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.

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: Within two working days after the test is performed, submit the report as an electronic attachment to the CQC Report.

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. Provide a copy of the final Testing Plan and Log to the OMSI preparer for inclusion into the OMSI 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, 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

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 Operation and Maintenance (O&M) 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.

f. Verify and document that all contract requirements for LEED fundamental commissioning are met.

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 only duties and responsibilities of the QC Manager are to manage and implement the QC program on this Contract. 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 three phases of control and documentation performed by testing laboratory personnel and any other inspection and testing personnel required by this Contract. The QC Manager is the manager of all QC activities. The QC manager is responsible for notifying the of activities which require their review.

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 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.

1.5.3 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.

1.6 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 quality control 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. Letters of direction are to be issued by the QC Manager to all other QC Specialists outlining their duties, authorities, and responsibilities. Include copies of the letters in the QC Plan.

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 QC Specialists or 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 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan, and prior to Government approval and 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 must be repeated.

1.7.1 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.

1.7.2 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.

1.7.3 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, CA, Environmental Manager, and subcontractor

representatives. Each subcontractor who will be assigned QC responsibilities must 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 and the Contracting Officer. Provide a copy of the signed minutes to all attendees and include in the QC Plan.

1.8 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.

1.9 DESIGN REVIEW AND DOCUMENTATION

1.9.1 Basis of Design and Design Intent

The CA must review the basis of design received from the Contracting Officer and the design intent. The Basis of Design is not part of the contract documents, but will be provided by the Contracting Officer upon request. Document the Basis of Design review in the Design Review report required below.

1.9.2 Contract Document Review

The CA must 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. Fully document contract document review in written report.

1.10 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.

1.10.1 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. When the DFOW will be accomplished by a subcontractor, that subcontractor's foreman must 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.

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

h. Coordinate the schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

i. Arrange for the return of shipping/packaging materials, such as wood pallets, where economically feasible.

j. 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 and are properly stored.

k. 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.

l. 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.

m. Review the Cx Plan and ensure all preliminary work items have been completed and documented.

1.10.2 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 level of workmanship and verify that it meets the minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

b. Resolve any workmanship issues.

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 project specific work plans (i.e. Cx, HAZMAT Abeatement, Stormwater Management) to ensure all preparatory work items have been completed and documented.

1.10.3 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.

1.10.4 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.

1.10.5 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.

1.11 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review and approval of submittals are described in Section 01 33 00 SUBMITTAL PROCEDURES.

1.12 TESTING

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

1.12.1 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 must meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the Corporate Office.

1.12.2 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.amrl.net/amrlsitefinity/default/aap.aspx , International Accreditation Services, Inc. (IAS) at http://www.iasonline.org, U. S. Army Corps of Engineers Materials Testing Center (MTC) at http://gsl.erdc.usace.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://wacel.org/fmi/xsl/wacel/index.xsl (Approval authority by WACEL is limited to projects within Facilities Engineering Command (FEC) Washington geographical area).

1.12.3 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.

1.12.4 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, in accordance with paragraph INFORMATION FOR THE CONTRACTING OFFICER.

1.12.5 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.

1.13 QC CERTIFICATIONS

1.13.1 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."

1.13.2 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.

1.13.3 Completion Certification

Upon completion of work under this Contract, the QC Manager must 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.

1.14 COMPLETION INSPECTIONS

1.14.1 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".

1.14.2 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 CQM 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.

1.14.3 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/ROICC 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."

1.15 DOCUMENTATION

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

1.15.1 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.

1.15.2 Quality Control Validation

Establish and maintain the following in a series of three ring binders. Binders must 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.

1.15.3 Testing Plan and Log

As tests are performed, 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.

1.15.4 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.

1.15.5 As-Built Drawings

The QC Manager is required to ensure the as-built drawings, required by Section 01 78 00 CLOSEOUT SUBMITTALS 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.

1.16 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, is 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.

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 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
08/09

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WATER WORKS ASSOCIATION (AWWA)

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

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

FCCCHR List	(continuously updated) List of Approved Backflow Prevention Assemblies
FCCCHR Manual	(10th Edition) Manual of Cross-Connection Control

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2013) 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	(2009) Manual on Uniform Traffic Control Devices

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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. 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

SD-07 Certificates

Backflow Tester Certification

Backflow Preventers Certificate of Full Approval

1.3 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 which may have to be graveled to prevent the tracking of mud. 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, and worker parking areas.

1.4 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.

1.4.1 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.

1.4.2 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.

1.5 HURRICANE 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 Requirements.

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.

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.

2.1.2 Project and Safety Signs

The requirements for the signs, their content, and location are as specified in Section 01 58 00 PROJECT IDENTIFICATION. 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

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.

a. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 48 inches high and maximum mesh size of 2 inches, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. Install fencing 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. Include frequent inspection of all equipment and apparatus.

2.2.5 Backflow Preventers

Reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged cast iron, bronze mounted gate valve and strainer, 304 stainless steel or bronze, internal parts. The particular make, model/design, and size of backflow preventers to be installed 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. This area will be within reasonable walking distance of the construction site. Contractor employee parking must not interfere with existing and established parking requirements of the government installation.

3.2 TEMPORARY BULLETIN BOARD

Locate the bulletin board at the project site in a conspicuous place easily

accessible to all employees, as approved by the Contracting Officer.

3.3 AVAILABILITY AND USE OF UTILITY SERVICES

3.3.1 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.

3.3.2 Payment for Utility Services

a. The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed will be charged to or paid for by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. Carefully conserve any utilities furnished without charge.

3.3.3 Meters and Temporary Connections

At the Contractors expense and in a manner satisfactory to the Contracting Officer, provide and maintain necessary temporary connections, distribution lines, and meter bases (Government will provide meters) required to measure the amount of each utility used for the purpose of determining charges. Notify the Contracting Officer, in writing, 5 working days before final electrical connection is desired so that a utilities contract can be established. The Government will provide a meter and make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. The Contractor will not make the final electrical connection.

3.3.4 Advance Deposit

An advance deposit for utilities consisting of an estimated month's usage or a minimum of $50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed to the Contractor prior to the end of the current fiscal year.

3.3.5 Final Meter Reading

Before completion of the work and final acceptance of the work by the Government, notify the Contracting Officer, in writing, 5 working days before termination is desired. The Government will take a final meter reading, disconnect service, and remove the meters. Then remove all the temporary distribution lines, meter bases, and associated paraphernalia. Pay all outstanding utility bills before final acceptance of the work by the Government.

3.3.6 Sanitation

a. 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 station 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 station regulations and procedures when discharging into the station 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.

3.3.7 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.3.8 Obstruction Lighting of Cranes

Provide a minimum of 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.

3.3.9 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials weekly to minimize potential hazards.

3.4 TRAFFIC PROVISIONS

3.4.1 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 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. Make all notifications and obtain any permits required for modification to traffic movements outside Station's jurisdiction.. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority 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 will obstruct 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, overhead protection authority having jurisdiction.

3.4.2 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.

3.4.3 Rush Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations for NAS Patuxent River without notification to and approval by the Contracting Officer.

3.4.4 Dust Control

Dust control methods and procedures must be approved by the Contracting Officer. Treat dust abatement on access roads with applications of calcium chloride, water sprinklers, or similar methods or treatment.

3.5 CONTRACTOR'S TEMPORARY FACILITIES

Contractor-owned or -leased trailers must be identified by Government assigned numbers. Size and location of the number will comply with NAS Patuxent River. Apply the number to the trailer within 14 calendar days of notification, or sooner, if directed by the Government.

3.5.1 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.

3.5.2 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.

3.5.3 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.

3.5.4 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.

3.5.5 Maintenance of Storage Area

a. 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.

3.5.6 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.

3.5.7 Weather Protection of Temporary Facilities and Stored Materials

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

3.5.7.1 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.

3.6 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.

3.7 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. 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.

3.8 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 any salvageable materials resulting from demolition activities within the fenced area described above or at the supplemental storage area. Neatly stack stored materials not in trailers, whether new or salvaged.

3.9 RESTORATION OF STORAGE AREA

Upon completion of the project remove the bulletin board, signs, barricades, haul roads, 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 areas used by the Contractor for the storage of equipment or material, or other use to the original or better condition. Remove gravel used to traverse grassed areas and restore the area to its original condition, including top soil and seeding as necessary.

-- End of Section --

SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS
11/15

PART 1 GENERAL

1.1 REFERENCES

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

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

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 112	Oil Pollution Prevention
40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 261.7	Residues of Hazardous Waste in Empty Containers
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 262.31	Standards Applicable to Generators of Hazardous Waste-Labeling
40 CFR 262.34	Standards Applicable to Generators of Hazardous Waste-Accumulation Time
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 273	Standards For Universal Waste Management
40 CFR 273.2	Standards for Universal Waste Management - Batteries
40 CFR 273.4	Standards for Universal Waste Management - Mercury Containing Equipment
40 CFR 273.5	Standards for Universal Waste Management - Lamps
40 CFR 279	Standards for the Management of Used Oil
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 300.125	National Oil and Hazardous Substances Pollution Contingency Plan - Notification and Communications
40 CFR 355	Emergency Planning and Notification
40 CFR 50	National Primary and Secondary Ambient Air Quality Standards
40 CFR 60	Standards of Performance for New Stationary Sources
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 63	National Emission Standards for Hazardous Air Pollutants for Source Categories
40 CFR 64	Compliance Assurance Monitoring
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Class I and II Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act. A list of Class I ODS can be found on the EPA website at the following weblink. http://www.epa.gov/ozone/science/ods/classone.html.

Class II ODS is defined in Section 602(s) of The Clean Air Act. A list of Class II ODS can be found on the EPA website at the following weblink. http://www.epa.gov/ozone/science/ods/classtwo.html.

1.2.2 Contractor Generated Hazardous Waste

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

1.2.3 Electronics Waste

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

1.2.4 Environmental Pollution and Damage

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

1.2.5 Environmental Protection

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

1.2.6 Hazardous Debris

As defined in paragraph SOLID WASTE, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) in accordance with 40 CFR 261. Hazardous debris also includes debris that exhibits a characteristic of hazardous waste in accordance with 40 CFR 261.

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

1.2.8 Hazardous Waste

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

1.2.9 Municipal Separate Storm Sewer System (MS4) Permit

MS4 permits are those held by installations to obtain NPDES permit coverage for their stormwater discharges.

1.2.10 National Pollutant Discharge Elimination System (NPDES)

The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

1.2.11 Oily Waste

Oily waste are those materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from that POLs. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, POLs and may be appropriately tested and discarded in a manner which is in compliance with other state and local requirements.

This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "de minimus" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal. As this can be an expensive process, it is recommended that this type of waste be minimized through good housekeeping practices and employee education.

1.2.12 Regulated Waste

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

1.2.13 Sediment

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

1.2.14 Solid Waste

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

1.2.14.1 Debris

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

1.2.14.2 Green Waste

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

1.2.14.3 Non-Hazardous Waste

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

1.2.14.4 Recyclables

Recyclables are materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable, wiring, insulated/non-insulated copper wire cable, and structural components. It also includes commercial-grade refrigeration equipment with Freon removed, household appliances where the basic material content is metal, clean polyethylene terephthalate bottles, cooking oil, used fuel oil, textiles, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal meeting the definition of lead contaminated or lead based paint contaminated may be included as recyclable if sold to a scrap metal company. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a scrap metal company.

1.2.14.5 Surplus Soil

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

1.2.14.6 Scrap Metal

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

1.2.14.7 Wood

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

1.2.15 Surface Discharge

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

1.2.16 Wastewater

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

1.2.16.1 Stormwater

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

1.2.17 Waters of the United States

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

1.2.18 Wetlands

Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

1.2.19 Universal Waste

The universal waste regulations streamline collection requirements for

certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (for example, thermostats), and lamps (for example, fluorescent bulbs). The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found 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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preconstruction Survey; G

Solid Waste Management Permit; G

Regulatory Notifications; G

Environmental Protection Plan; G

Stormwater Notice of Intent (for NPDES coverage under the general permit for construction activities); G

Stormwater Pollution Prevention Plan; G

Dirt and Dust Control Plan; G

Employee Training Records; G

Environmental Manager Qualifications; G

Coastal Zone Management Act Federal Consistency Determination

SD-06 Test Reports

Laboratory Analysis; G

Inspection Reports; G

Solid Waste Management Report; G

SD-07 Certificates

Employee Training Records; G

ECATTS Certificate Of Completion; G

Erosion and Sediment Control Inspector Qualifications

SD-11 Closeout Submittals

Stormwater Pollution Prevention Plan Compliance Notebook; G

Stormwater Notice of Termination (for NPDES coverage under the general permit for construction activities); G

Waste Determination Documentation; G

Disposal Documentation for Hazardous and Regulated Waste; G

Assembled Employee Training Records; G

Solid Waste Management Permit; G

Solid Waste Management Report; G

Contractor Hazardous Material Inventory Log; G

Hazardous Waste/Debris Management; G

Regulatory Notifications; G

Sales Documentation; G

Contractor Certification; G

As-Built Topographic Survey; G

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during 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. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this Contract. Comply with federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

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

1.4.1 Training in Environmental Compliance Assessment Training and Tracking System (ECATTS)

1.4.1.1 Personnel Requirements

The Environmental Manager is responsible for environmental compliance on projects. The Environmental Manager and, must complete applicable ECATTS training modules (installation specific or general) 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 must complete applicable ECATTS training within 14 days of assignment to the project.

1.4.1.2 Certification

Submit an ECATTS certificate of completion for personnel who have completed the required 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 https://environmentaltraining.ecatts.com/. Obtain the password for registration from the Contracting Officer.

1.4.1.3 Refresher Training

This training has been structured to allow contractor personnel to receive credit under this contract and to carry forward credit to future contracts. Ensure the 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 required to retake modules tailored to the state where the contract work is being performed.

1.4.2 Conformance with the Environmental Management System

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

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

1.5 SPECIAL ENVIRONMENTAL REQUIREMENTS

Comply with the special environmental requirements attached at the end of this section.

1.6 QUALITY ASSURANCE

1.6.1 Preconstruction Survey and Protection of Features

This paragraph supplements the Contract Clause PROTECTION OF EXISTING

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

1.6.2 Regulatory Notifications

Provide regulatory notification requirements in accordance with federal, state and local regulations. In cases where the Government will also provide public notification (such as stormwater permitting), coordinate with the Contracting Officer. Submit copies of regulatory notifications to the Contracting Officer within 30 days prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all-inclusive): demolition, renovation, NPDES defined site work, construction, removal or use of a permitted air emissions source, and remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.6.3 Environmental Brief

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

Prior to initiating any work on site, meet with the Contracting Officer and installation Environmental Office to discuss the proposed Environmental Protection Plan (EPP). Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

1.6.4 Environmental Manager

Appoint in writing an Environmental Manager for the project site. The Environmental Manager is directly responsible for coordinating contractor compliance with federal, state, local, and installation requirements. The Environmental Manager must ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the EPP; ensure environmental permits are obtained, maintained, and closed out; ensure compliance with Stormwater Program requirements; ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, 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 Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain the Environmental Records binder and required documentation, including environmental permits compliance and close-out. Submit Environmental Manager Qualifications to the Contracting Officer.

1.6.5 Employee Training Records

Prepare and maintain Employee Training Records throughout the term of the contract meeting applicable 40 CFR requirements. Provide Employee Training Records in the Environmental Records Binder. Submit these Assembled Employee Training Records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

Train personnel to meet EPA requirements. Conduct environmental protection/pollution control meetings for personnel prior to commencing construction activities. Contact additional meetings for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, waters of the United States, and endangered species and their habitat that are known to be in the area. Provide copy of the Erosion and Sediment Control Inspector Qualifications as defined by EPA.

1.6.6 Non-Compliance Notifications

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

1.7 ENVIRONMENTAL PROTECTION PLAN

The purpose of the EPP is to present an overview of known or potential environmental issues that must be considered and addressed during construction. Incorporate construction related objectives and targets from the installation's EMS into the EPP. Include in the EPP measures for protecting natural and cultural resources, required reports, and other measures to be taken. Meet with the Contracting Officer or Contracting Officer Representative to discuss the EPP and develop a mutual understanding relative to the details for environmental protection including measures for protecting natural resources, required reports, and other measures to be taken. Submit the EPP within 15 days after notice to proceed and not less than 10 days before the preconstruction meeting. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications that change the project scope of work in a way that could have an environmental

impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws and regulations. During Construction, identify, implement, and submit for approval any additional requirements to be included in the EPP. Maintain the current version onsite.

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

1.7.1 General Overview and Purpose

1.7.1.1 Descriptions

A brief description of each specific plan required by environmental permit or elsewhere in this Contract such as stormwater pollution prevention plan, spill control plan, solid waste management plan, air pollution control plan, a historical, archaeological, cultural resources, biological resources and wetlands plan, traffic control plan Hazardous, Toxic and Radioactive Waste (HTRW) Plan Non-Hazardous Solid Waste Disposal Plan borrowing material plan.

1.7.1.2 Duties

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

1.7.1.3 Procedures

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

1.7.1.4 Communications

Communication and training procedures that will be used to convey environmental management requirements to Contractor employees and subcontractors.

1.7.1.5 Contact Information

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

1.7.2 General Site Information

1.7.2.1 Drawings

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

1.7.2.2 Work Area

Work area plan showing the proposed activity in each portion of the area

and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control plan.

1.7.2.3 Documentation

A letter signed by an officer of the firm appointing the Environmental Manager and stating that person 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.

1.7.3 Management of Natural Resources

a. Land resources

b. Tree protection

c. Replacement of damaged landscape features

d. Temporary construction

e. Stream crossings

f. Fish and wildlife resources

g. Wetland areas

1.7.4 Protection of Historical and Archaeological Resources

a. Objectives

b. Methods

1.7.5 Stormwater Management and Control

a. Ground cover

b. Erodible soils

c. Temporary measures

(1) Structural Practices

(2) Temporary and permanent stabilization

d. Effective selection, implementation and maintenance of Best Management Practices (BMPs).

1.7.6 Protection of the Environment from Waste Derived from Contractor Operations

Control and disposal of solid and sanitary waste. Control and disposal of hazardous waste.

This item consist of the management procedures for hazardous waste to be generated. The elements of those procedures will coincide with the Installation Hazardous Waste Management Plan. The Contracting Officer will

provide a copy of the Installation Hazardous Waste Management Plan. As a minimum, include the following:

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

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

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

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

e. Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted)

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

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

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

i. Plans for the disposal of hazardous waste by permitted facilities; and Procedures to be employed to ensure required employee training records are maintained.

1.7.7 Prevention of Releases to the Environment

Procedures to prevent releases to the environment

Notifications in the event of a release to the environment

1.7.8 Regulatory Notification and Permits

List what notifications and permit applications must be made. Some permits require up to 180 days to obtain. Demonstrate that those permits have been obtained or applied for by including copies of applicable environmental permits. The EPP will not be approved until the permits have been obtained.

1.7.9 Clean Air Act Compliance

1.7.9.1 Haul Route

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

1.7.9.2 Pollution Generating Equipment

Identify air pollution generating equipment or processes that may require federal, state, or local permits under the Clean Air Act. Determine

requirements based on any current installation permits and the impacts of the project. Provide a list of all fixed or mobile equipment, machinery or operations that could generate air emissions during the project to the Installation Environmental Office (Air Program Manager).

1.7.9.3 Stationary Internal Combustion Engines

Identify portable and stationary internal combustion engines that will be supplied, used or serviced. Comply with 40 CFR 60 Subpart IIII, 40 CFR 60 Subpart JJJJ, 40 CFR 63 Subpart ZZZZ, and local regulations as applicable. At minimum, include the make, model, serial number, manufacture date, size (engine brake horsepower), and EPA emission certification status of each engine. Maintain applicable records and log hours of operation and fuel use. Logs must include reasons for operation and delineate between emergency and non-emergency operation.

1.7.9.4 Refrigerants

Identify management practices to ensure that heating, ventilation, and air conditioning (HVAC) work involving refrigerants complies with 40 CFR 82 requirements. Technicians must be certified, maintain copies of certification on site, use certified equipment and log work that requires the addition or removal of refrigerant. Any refrigerant reclaimed is the property of the Government, coordinate with the Installation Environmental Office to determine the appropriate turn in location.

1.7.9.5 Air Pollution-engineering Processes

Identify planned air pollution-generating processes and management control measures (including, but not limited to, spray painting, abrasive blasting, demolition, material handling, fugitive dust, and fugitive emissions). Log hours of operations and track quantities of materials used.

1.7.9.6 Compliant Materials

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

1.8 LICENSES AND PERMITS

Obtain licenses and permits required for the construction of the project and in accordance with FAR 52.236-7. Contractor is responsible for all associated fees for licenses and permits required for construction of the project. Notify the Government of all general use permitted equipment the Contractor plans to use on site. This paragraph supplements the Contractor's responsibility under FAR 52.236-7.

a. The following permits have been obtained by the Government:

(1) State Historic Preservation Office (SHPO) Letter of Concurrence

(2) Notice of Intent (NOI) for Stormwater

1.9 ENVIRONMENTAL RECORDS BINDER

Maintain on-site a separate three-ring Environmental Records Binder and submit at the completion of the project. Make separate parts within the binder that correspond to each submittal listed under paragraph CLOSEOUT SUBMITTALS in this section.

1.10 SOLID WASTE MANAGEMENT PERMIT

Provide the Contracting Officer with written notification of the quantity of anticipated solid waste or debris that is anticipated or estimated 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 from the receiving location or as applicable; submit one copy of the receiving location state and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan before transporting wastes off Government property.

1.10.1 Solid Waste Management Report

Monthly, submit a solid waste disposal report to the Contracting Officer. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste.

1.11 FACILITY HAZARDOUS WASTE GENERATOR STATUS

NAS Patuxent River is designated as a Large Quantity Generator. Meet the regulatory requirements of this generator designation for any work conducted within the boundaries of this Installation. Comply with provisions of federal, state, and local regulatory requirements applicable to this generator status regarding training and storage, handling, and disposal of construction derived wastes.

1.12 Hazardous Materials Report

Existing buildings 1710, 155 and 1932 are required to be demolished under this contract. An investigation was performed and a report was prepared entitiled "Planning and Design Hazardous Materials Assessment Findings Report" dated June 12, 2015. Excerpts from the report are included at the end of this section. Contractor shall base his bid on the report in regards to cost of proper handling and disposal of hazardous materials.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitats. Prior to the commencement of activities, consult with the Installation Environmental Office, regarding rare species or sensitive habitats that need to be protected. The protection of rare, threatened, and endangered animal and plant species identified, including their habitats, is the Contractor's responsibility. The following species are known and could be affected within the construction area: American Bald Eagle.

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

3.1.1 Flow Ways

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

3.1.2 Vegetation

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

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

3.2 STORMWATER

Do not discharge stormwater from construction sites to the sanitary sewer. If the water is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Obtain authorization in advance from the Installation Environmental Office for any release of contaminated water.

3.2.1 Construction General Permit

A storm water Notice of Intent (NOI) for construction activities has been filed with the Maryland Department of the Environment (MDE) for the project. The contractor shall coordinate with the Contracting Officer regarding transfer of authorization for the NPDES stormwater during construction permit from the Government to the Contractor. The Contractor shall complete transfer of authorization within 14 days of notice to proceed. The contractor is responsible for all associated fees. No land disturbing activities shall be performed prior to the transfer. Under the terms and conditions of the permit, install, inspect, maintain BMPs, prepare stormwater erosion and sediment control inspection reports, and submit SWPPP inspection reports. Maintain construction operations and management in compliance with the terms and conditions of the general permit for stormwater discharges from construction activities.

3.2.1.1 Stormwater Pollution Prevention Plan

Submit a project-specific Stormwater Pollution Prevention Plan (SWPPP) to the Contracting Officer for approval, prior to the commencement of work. The SWPPP must meet the requirements of 40 CFR 122.26 and the Maryland

State General Permit for stormwater discharges from construction sites.

Include the following:

a. Comply with terms of the MDE general permit for stormwater discharges from construction activities. Prepare SWPPP in accordance with MDE requirements.

b. Select applicable BMPs in accordance with applicable state or local requirements.

c. Include a completed copy of the Notice of Intent, BMP Inspection Report Template, and Stormwater Notice of Termination, except for the effective date.

3.2.1.2 Stormwater Notice of Intent for Construction Activities

Submit the approved NOI and appropriate permit fees onto the appropriate federal or state agency for approval. No land disturbing activities may commence without permit coverage. Maintain an approved copy of the SWPPP at the onsite construction office, and continually update as regulations require, reflecting current site conditions.

3.2.1.3 Inspection Reports

Submit "Inspection Reports" to the Contracting Officer in accordance with the State of MarylandConstruction General Permit.

3.2.1.4 Stormwater Pollution Prevention Plan Compliance Notebook

Create and maintain a three ring binder of documents that demonstrate compliance with the Construction General Permit. Include a copy of the permit Notice of Intent, proof of permit fee payment, SWPPP and SWPPP update amendments, inspection reports and related corrective action records, copies of correspondence with the the MarylandState Permitting Agency, and a copy of the permit Notice of Termination in the binder. At project completion, the notebook becomes property of the Government. Provide the compliance notebook to the Contracting Officer.

3.2.1.5 Stormwater Notice of Termination for Construction Activities

Submit a Notice of Termination to the Contracting Officer for approval once construction is complete and final stabilization has been achieved on all portions of the site for which the permittee is responsible. Once approved, submit the Notice of Termination to the appropriate state or federal agency.

3.2.2 Erosion and Sediment Control Measures

Provide erosion and sediment control measures in accordance with state and local laws and regulations. Preserve vegetation to the maximum extent practicable.

Erosion control inspection reports may be compiled as part of a stormwater pollution prevention plan inspection reports.

3.2.3 Work Area Limits

Mark the areas that need not be disturbed under this Contract prior to

commencing construction activities. Mark or fence isolated areas within the general work area that are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers must be visible in the dark. Personnel must be knowledgeable of the purpose for marking and protecting particular objects.

3.2.4 Contractor Facilities and Work Areas

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

Staging Area D off of Cedar Point road, shown in both Phases 2 and 3, has a high invasive plant species concentration. Contractor is to use appropriate herbicide, followed by mowing, prior to use of this area in order to minimize transport of these species to other locations. Two weeks prior to beginning work in this area, contact Jackie Smith, Natural Resources Specialist, PWD Environmental Div., NAS Pax River at (301) 757-0007 for additional information.

3.2.5 Municipal Separate Storm Sewer System (MS4) Management

Comply with the Installation's MS4 permit requirements.

3.3 SURFACE AND GROUNDWATER

3.3.1 Cofferdams, Diversions, and Dewatering

Construction operations for dewatering, and excavation must be constantly controlled to maintain compliance with existing state water quality standards and designated uses of the surface water body. Comply with the State of Maryland water quality standards and anti-degradation provisions and the Clean Water Act Section 404. Do not discharge excavation ground water to the sanitary sewer, storm drains, or to surface waters without prior specific authorization in writing from the Installation Environmental Office. Discharge of hazardous substances will not be permitted under any circumstances. Use sediment control BMPs to prevent construction site runoff from directly entering any storm drain or surface waters.

If the construction dewatering is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Obtain authorization for any contaminated groundwater release in advance from the Installation Environmental Officer and the federal or state authority, as applicable. Discharge of hazardous substances will not be permitted under any circumstances.

3.3.2 Waters of the United States

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

3.4 PROTECTION OF CULTURAL RESOURCES

3.4.1 Historical Resources

Existing historical resources within the work area are shown on the drawings. Protect these resources and be responsible for their preservation during the life of the Contract. See SHPO Letter of Concurrence at the end of this section.

3.5 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with 40 CFR 64 and state air emission and performance laws and standards.

3.5.1 Burning

Burning is prohibited on the Government premises.

3.5.2 EPA Certification Requirements

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

3.5.3 Dust Control

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

3.5.3.1 Particulates

Dust particles, aerosols and gaseous by-products from construction activities, and processing and preparation of materials (such as from asphaltic batch plants) must be controlled at all times, including weekends, holidays, and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates that would exceed 40 CFR 50, state, and local air pollution standards or that would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators, or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with state and local visibility regulations.

3.5.3.2 Abrasive Blasting

Blasting operations cannot be performed without prior approval of the Installation Air Program Manager. 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. Perform work involving removal of hazardous material in accordance with 29 CFR 1910.

3.5.4 Odors

Control odors from construction activities. The odors must be in compliance with state regulations and local ordinances and may not constitute a health hazard.

3.6 WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Obtain a copy of the installation's Pollution Prevention/Hazardous Waste Minimization Plan for reference material when preparing this part of the EPP. If no written plan exists, obtain information by contacting the Contracting Officer. Describe the anticipated types of the hazardous materials to be used in the construction when requesting information.

3.6.1 Salvage, Reuse and Recycle

Identify anticipated materials and waste for salvage, reuse, and recycling. Describe actions to promote material reuse, resale or recycling. To the extent practicable, all scrap metal must be sent for reuse or recycling and will not be disposed of in a landfill.

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

3.6.2 Nonhazardous Solid Waste Diversion Report

Maintain an inventory of nonhazardous solid waste diversion and disposal of construction and demolition debris. Submit a report through the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that nonhazardous solid waste has been generated. Include the following in the report:

Construction and Demolition (C&D) Debris Disposed	cubic yards, as appropriate
C&D Debris Recycled	cubic yards, as appropriate
Total C&D Debris Generated	cubic yards, as appropriate

Construction and Demolition (C&D) Debris Disposed	cubic yards, as appropriate
Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount)	cubic yards, as appropriate

3.7 WASTE MANAGEMENT AND DISPOSAL

3.7.1 Waste Determination Documentation

Complete a Waste Determination form (provided at the pre-construction conference) for Contractor-derived wastes to be generated. All potentially hazardous solid waste streams that are not subject to a specific exclusion or exemption from the hazardous waste regulations (e.g. scrap metal, domestic sewage) or subject to special rules, (lead-acid batteries and precious metals) must be characterized in accordance with the requirements of 40 CFR 261 or corresponding applicable state or local regulations. Base waste determination on user knowledge of the processes and materials used, and analytical data when necessary. Consult with the Installation environmental staff for guidance on specific requirements. Attach support documentation to the Waste Determination form. As a minimum, provide a Waste Determination form for the following waste (this listing is not inclusive): oil- and latex -based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and containers of the original materials.

3.7.2 Solid Waste Management

3.7.2.1 Solid Waste Management Report

Provide copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, a statement indicating the disposal location for the solid waste that is signed by an employee authorized to legally obligate or bind the firm may be submitted. The sales documentation must include the receiver's tax identification number and business, EPA or state registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained for the Contractor's own use, submit the information previously described in this paragraph on the solid waste disposal report. Prices paid or received do not have to be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

3.7.2.2 Control and Management of Solid Wastes

Pick up solid wastes, and place in covered containers that are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with non-hazardous solid waste. Transport solid waste off Government property and dispose of it in compliance with 40 CFR 260, state, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill is the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the

necessary permits and licenses to operate. Solid waste disposal offsite must comply with most stringent local, state, and federal requirements, including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

Manage hazardous material used in construction, including but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, and used rags, in accordance with 49 CFR 173.

3.7.3 Control and Management of Hazardous Waste

Do not dispose of hazardous waste on Government property. Do not discharge any waste to a sanitary sewer, storm drain, or to surface waters or conduct waste treatment or disposal on Government property without written approval of the Contracting Officer.

3.7.3.1 Hazardous Waste/Debris Management

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

Manage hazardous waste in accordance with the approved Hazardous Waste Management Section of the EPP. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities is identified as being generated by the Government. Prior to removal of any hazardous waste from Government property, hazardous waste manifests must be signed by personnel from the Installation Environmental Office. Do not bring hazardous waste onto Government property. Provide the Contracting Officer with 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.

3.7.3.2 Waste Storage/Satellite Accumulation/90 Day Storage Areas

Accumulate hazardous waste at satellite accumulation points and in compliance with 40 CFR 262.34 and applicable state or local regulations. Individual waste streams will be limited to 55 gallons of accumulation (or 1 quart for acutely hazardous wastes). If the Contractor expects to generate hazardous waste at a rate and quantity that makes satellite accumulation impractical, the Contractor may request a temporary 90 day accumulation point be established. Submit a request in writing to the Contracting Officer and provide the following information (Attach Site Plan to the Request):

Contract Number	
Contractor	
Haz/Waste or Regulated Waste POC	
Phone Number	
Type of Waste	
Source of Waste	

Contract Number	
Emergency POC	
Phone Number	
Location of the Site	

Attach a Waste Determination form for the expected waste streams. Allow 10 working days for processing this request. Additional compliance requirements (e.g. training and contingency planning) that may be required are the responsibility of the Contractor. Barricade the designated area where waste is being stored and post a sign identifying as follows:

"DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

3.7.3.3 Hazardous Waste Disposal

3.7.3.3.1 Responsibilities for Contractor's Disposal

Provide hazardous waste manifest to the Installations Environmental Office for review, approval, and signature prior to shipping waste off Government property.

3.7.3.3.1.1 Services

Provide service necessary for the final treatment or disposal of the hazardous material or waste in accordance with 40 CFR 260, local, and state, laws and regulations, and the terms and conditions of the Contract within 60 days after the materials have been generated. These services include necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal or transportation, include manifesting or complete waste profile sheets, equipment, and compile documentation).

3.7.3.3.1.2 Samples

Obtain a representative sample of the material generated for each job done to provide waste stream determination.

3.7.3.3.1.3 Analysis

Analyze each sample taken and provide analytical results to the Contracting Officer. See paragraph WASTE DETERMINATION DOCUMENTATION.

3.7.3.3.1.4 Labeling

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

3.7.3.4 Universal Waste Management

Manage the following categories of universal waste in accordance with

federal, state, and local requirements and installation instructions:

a. Batteries as described in 40 CFR 273.2

b. Lamps as described in 40 CFR 273.5

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

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

3.7.3.5 Electronics End-of-Life Management

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

3.7.3.6 Disposal Documentation for Hazardous and Regulated Waste

Contact the Contracting Officer for the facility RCRA identification number that is to be used on each manifest.

Submit a copy of the applicable EPA and or state permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities. Hazardous or toxic waste manifests must be reviewed, signed, and approved by the Contracting Officer before the Contractor may ship waste. To obtain specific disposal instructions, coordinate with the Installation Environmental Office.

3.7.4 Releases/Spills of Oil and Hazardous Substances

3.7.4.1 Response and Notifications

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Installation Fire Department, the Installation Command Duty Officer, the Installation Environmental Office, the Contracting Officer and the state or local authority.

Submit verbal and written notifications as required by the federal (40 CFR 300.125 and 40 CFR 355), state, local regulations and instructions. Provide copies of the written notification and documentation that a verbal notification was made within 20 days. Spill response must be in accordance with 40 CFR 300 and applicable state and local regulations. Contain and clean up these spills without cost to the Government.

3.7.4.2 Clean Up

Clean up hazardous and non-hazardous waste spills. Reimburse the Government for costs incurred including sample analysis materials, clothing, equipment, and labor if the Government will initiate its own spill cleanup procedures, for Contractor- responsible spills, when: Spill cleanup procedures have not begun within one hour of spill discovery/occurrence; or, in the Government's judgment, spill cleanup is inadequate and the spill remains a threat to human health or the environment.

3.7.5 Mercury Materials

Immediately report to the Environmental Office and the Contracting Officer instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the Contracting Officer.

Do not recycle a mercury spill cleanup; manage it as a hazardous waste for disposal.

3.8 HAZARDOUS MATERIAL MANAGEMENT

Include hazardous material control procedures in the Safety Plan, in accordance with Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. Address procedures and proper handling of hazardous materials, including the appropriate transportation requirements. Do not bring hazardous material onto Government property that does not directly relate to requirements for the performance of this contract. Submit an SDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on the installation. Typical materials requiring SDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. Use hazardous materials in a manner that minimizes the amount of hazardous waste generated. Containers of hazardous materials must have National Fire Protection Association labels or their equivalent. Certify that hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste, in accordance with 40 CFR 261.

3.8.1 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 SDS, 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. Keep copies of the SDSs for hazardous materials onsite. At the end of the project, provide the Contracting Officer with copies of the SDSs, and 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.

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

3.9 PREVIOUSLY USED EQUIPMENT

Clean previously used construction equipment prior to bringing it onto the project site. Equipment must be free from soil residuals, egg deposits

from plant pests, noxious weeds, and plant seeds. Consult with the U.S. Department of Agriculture jurisdictional office for additional cleaning requirements.

3.10 CONTROL AND MANAGEMENT OF ASBESTOS-CONTAINING MATERIAL (ACM)

Manage and dispose of asbestos- containing waste in accordance with 40 CFR 61. Refer to Section 02 82 16.00 20 ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS. Manifest asbestos-containing waste and provide the manifest to the Contracting Officer. Notifications to the state and Installation Air Program Manager are required before starting any asbestos work.

3.11 CONTROL AND MANAGEMENT OF LEAD-BASED PAINT (LBP)

Manage and dispose of lead-contaminated waste in accordance with 40 CFR 745 and Section 02 82 33.13 20 REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD;. Manifest any lead-contaminated waste and provide the manifest to the Contracting Officer.

3.12 CONTROL AND MANAGEMENT OF LIGHTING BALLAST AND LAMPS CONTAINING PCBS

Manage and dispose of contaminated waste in accordance with 40 CFR 761. Refer to Section 02 84 16 HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBS AND MERCURY.

3.13 PETROLEUM, OIL, LUBRICANT (POL) STORAGE AND FUELING

POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, mineral oil, and cooking oil. Store POL products and fuel equipment and motor vehicles in a manner that affords the maximum protection against spills into the environment. Manage and store POL products in accordance with EPA 40 CFR 112, and other federal, state, regional, and local laws and regulations. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States. Describe in the EPP (see paragraph ENVIRONMENTAL PROTECTION PLAN) how POL tanks and containers must be stored, managed, and inspected and what protections must be provided. Storage of fuel on the project site must be in accordance with EPA, state, and local laws and regulations and paragraph OIL STORAGE INCLUDING FUEL TANKS.

3.13.1 Used Oil Management

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

3.13.2 Oil Storage Including Fuel Tanks

Provide secondary containment and overfill protection for oil storage tanks. A berm used to provide secondary containment must be of sufficient size and strength to contain the contents of the tanks plus 5 inches freeboard for precipitation. Construct the berm to be impervious to oil

for 72 hours that no discharge will permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Use drip pans during oil transfer operations; adequate absorbent material must be onsite to clean up any spills and prevent releases to the environment. Cover tanks and drip pans during inclement weather. Provide procedures and equipment to prevent overfilling of tanks. If tanks and containers with an aggregate aboveground capacity greater than 1320 gallons will be used onsite (only containers with a capacity of 55 gallons or greater are counted), provide and implement a SPCC plan meeting the requirements of 40 CFR 112. Do not bring underground storage tanks to the installation for Contractor use during a project. Submit the SPCC plan to the Contracting Officer for approval.

Monitor and remove any rainwater that accumulates in open containment dikes or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present.

3.14 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, immediately notify the Contracting Officer. Do not disturb this material until authorized by the Contracting Officer.

3.15 CHLORDANE

Evaluate excess soils and concrete foundation debris generated during the demolition of housing units or other wooden structures for the presence of chlordane or other pesticides prior to reuse or final disposal.

3.16 SOUND INTRUSION

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

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the State of Maryland rules.

3.17 POST CONSTRUCTION CLEANUP

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

-- End of Section --

ATTACHMENT
SHPO FINDING OF NO IMPACT

201505313

F
Navy
ARA/EJR

DEPARTMENT OF THE NAVY

NAVAL AIR STATION
22268 CEDAR POINT ROAD
PATUXENT RIVER, MARYLAND 20670-1154

RECEIVED
DEC 03 2015
BY:_____

IN REPLY REFER TO:
8090
Ser N45/650
DEC 01 2015

State Historic Preservation Office
Attn: Amanda Apple
Maryland Historical Trust
100 Community Place
Crownsville, Maryland 21032-2023

Dear Ms. Apple:

ST Co.
SM-357

SUBJECT: PHASE TWO AND THREE, REPAIR RUNWAYS 14-32 AND 6-24, MAIN BASE, NAVAL AIR STATION PATUXENT RIVER, ST. MARYS COUNTY, MARYLAND

Naval Air Station (NAS) Patuxent River anticipates the continuation of a three phased runway repair project that will address deficiencies in the airfield surfaces, upgrade associated lighting systems and replace a compass rose. The purpose of this letter is to initiate consultation with the State Historic Preservation Office (SHPO) on Phase 2 and 3 of this undertaking per Section 106 of the National Historic Preservation Act of 1966, as amended. Consultation with SHPO for Phase 1 was undertaken earlier this year and SHPO concurrence was received on March 3, 2015 (#2015500696).

The runways and taxiways at NAS Patuxent River were originally constructed in 1942-1943 and have been determined by the Navy to be eligible for the National Register of Historic Places (NRHP) as part of the historic landscape survey (*Historic Landscape Survey Naval Air Station Patuxent River, Webster Field and Solomons Complex, 2009).* The Navy characterizes the bulk of this undertaking as being necessary periodic maintenance of this extremely active airfield.

This consultation is for both Phase 2 and 3 of the three phase project and the Area of Potential Effect for these phases are limited to the immediate area of the runways and taxiways. Phase 2 is the replacement of the existing lighting system, which is not historic. The scope of Phase 3 involves performing essentially the same work for Runway 6-24 that was done in Phase 1 for Runway 14-32 (Enclosure (1)). Phase 3 involves milling the current surfaces of the runway, which are mostly asphalt, and then adding asphalt on top of existing surfaces. The approach ends of the runways are concrete and these surfaces will be repaired and replaced as needed. The resurfacing is required because the current surfaces are degrading, which creates unsafe conditions for aircraft operations. The current top surfaces overlay multiple earlier surfaces and the plans do not anticipate any effect on the underlying, earlier original runway surfaces.

12/10/15

The project includes the replacement of one of the three compass roses located on the airfield (Enclosure (2), Figure A). A compass rose is a circular concrete paved area where aircraft are rotated through 360 degrees to calibrate their compasses (Enclosure (3)). When built in the early 1940's these compass roses had small circular bronze markers embedded in the concrete at each 15 degree point around the 360 degrees of the compass (Enclosure (4)). Modern compass roses no longer use these bronze markers and use painted lines instead (Enclosure (5)). Each compass rose has a center turntable, which historically was made of bronze, on which one main gear wheel is placed and around which the plane is pivoted.

Based upon their relationship to the airfield, all three of the compass roses were determined by the Navy to be eligible for the NRHP as part of the 2009 Landscape survey referenced above. The Determination of Eligibility is included as Enclosure (6). The Navy has been unable to locate a concurrence from SHPO for this determination.

The compass rose (B-2468) that the Navy proposes to replace is no longer used because it is in very poor condition. Over 50 percent of its original concrete surface has become extensively degraded and is now loose concrete (Enclosure (7)). Few of its original bronze heading markers remain and the turntable was removed long ago and replaced with concrete (Enclosure (8)). The Navy believes that it has lost much of its historical integrity, particularly in regard to design, materials and workmanship. When the Determination of Eligibility was prepared, it is believed that the surveyors did not actually closely examine this compass rose and they noted it was then being used as a parking area for vehicles and photographed it from a distance. With the replacement of this compass rose, the function of the original compass rose will be restored at this location, thus preserving the location, setting, and feeling and thereby restoring its original relationship to the airfield. However, the replacement of the concrete and removal of few remaining direction markers will affect the original design, materials and workmanship. The Navy does not believe that this rises to the level of an adverse effect.

The other two compass roses are in much better condition. The compass rose B-698 off Taxiway Charlie is the only compass rose currently in use and is in very good condition (Enclosure (5)). It has the original bronze bearing markers at 15 degree intervals. However, the original bronze turntable has been replaced with a modern, aluminum turntable. Compass rose B-699 is located off an abandoned portion of Taxiway Alpha and is no longer used. This compass rose is in its original historic condition and is intact with the bronze bearing markers and the original bronze turntable.

The Navy believes that the replacement of a single compass rose while there are two other compass roses that are in much better, more original condition does not constitute an adverse effect. Additionally, the compass rose to be replaced is in very poor condition and must be replaced in order for it to become usable again and thereby restore its function and original relationship with the airfield.

Ground disturbances will be minimal, mostly associated with the lighting system replacement, some drainage improvements and staging and work areas. There are no archaeological sites in the infield, as this area was extensively disturbed during original grading and construction of the airfield.

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Ser N45/650

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The Navy believes that Phase 2 and 3 of the runway repair project is a maintenance activity that allows the runways to continue to be used for their intended purpose and that the replacement of a compass rose with a new compass rose at the same location does not constitute an adverse effect on cultural resources. The Navy requests the concurrence of SHPO. If you have any questions please contact, Michael A. Smolek, Cultural Resources Program Manager, by email at michael.a.smolek@navy.mil or by telephone at (301) 757-4774.

Sincerely,

A. M. MOORE
Commander, CEC, USN
Public Works Officer
By direction of the
Commanding Officer

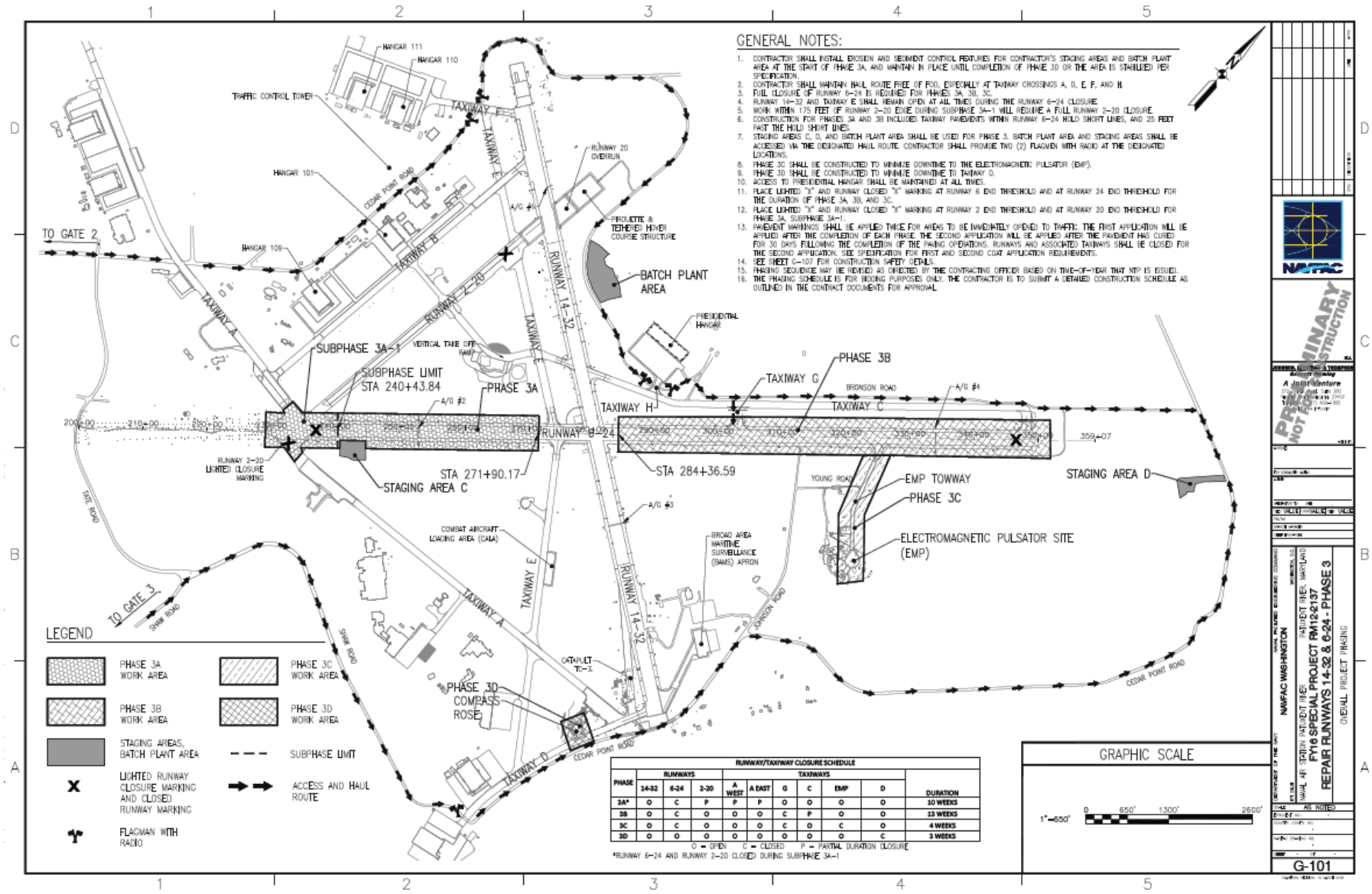
Enclosures:
1. Project Area
2. Aerial Photographs of Compass Roses
3. Historic Photo of a Compass Rose in Use
4. Example of Original Bronze Marker on B-699
5. Recent Photo of B-698
6. Determination of Eligibility (6 pages)
7. Photo of Compass Rose B-2468
8. Photo of Compass Rose B-2468

The State Historic Preservation Office concurs that Phase 2 and 3 of the Runways Repair undertaking does not constitute an adverse effect on historic cultural resources.

Beth Cole
State Historic Preservation Office

12/22/2015
Date

(*) Degraded resource in-kind modern replacement of Compass Rose B-2468 AM 12/10/15



Project Areas for Phase 3 of the Runway Repairs Project. Phase 2 is for Replacement of the Non-historic Airfield Lighting System

Figure A: Location of Compass Roses on the Airfield

Figure B: Aerial Photograph of Compass Rose B-2468 which is planned to be replaced.

Early 1940s Photograph of a C-47 on Compass Rose B-698. Left main gear is placed on the turntable in the center of the compass rose, the plane is rotated through 360 degrees and the compass error (deviation) is recorded for each 15 degrees azimuth.

Example of one of the original bronze direction markers installed every 15 degrees azimuth. Photo is of Compass Rose B-699 where all original markers and bronze turntable remain intact.

Recent Photo of B-698, the only compass rose currently in use. Turntable has been replaced and lines painted to account for Magnetic North movement since its construction in the early 1940s

MARYLAND HISTORICAL TRUST
DETERMINATION OF ELIGIBILITY FORM

NR Eligible: yes ___ no ___

Property Name: Compass Roses, Facility Nos. 698, 699, and 2468 Inventory Number: Contrib.Res.

Address: _____ Historic district: ___ yes X no

City: NAS Patuxent River Zip Code: 20670 County: Saint Marys

USGS Quadrangle(s): Solomons Island

Property Owner: United States Navy Tax Account ID Number: _____

Tax Map Parcel Number(s): _____ Tax Map Number: _____

Project: _____ Agency: NAVFAC Washington

Agency Prepared By: The Louis Berger Group, Inc.

Preparer's Name: Patti Kuhn Date Prepared: 3/23/2010

Documentation is presented in: _____

Preparer's Eligibility Recommendation: X Eligibility recommended ___ Eligibility not recommended

Criteria: X A ___ B X C ___ D Considerations: ___ A ___ B ___ C ___ D ___ E ___ F ___ G

Complete if the property is a contributing or non-contributing resource to a NR district/property:

Name of the District/Property: Flight Test/Tactical Test/NAS Operations

Inventory Number: SM-899 Eligible: X yes Listed: ___ yes

Site visit by MHT Staff ___ yes X no Name: _____ Date: _____

Description of Property and Justification: *(Please attach map and photo)*

Description

Facility No. 698, a compass rose, stands on the north side of Taxiway Charlie, east of Taxiway Bravo and west of Runway 20. It is a circular concrete pad with centered, painted circular markings and a center point.

Facility No. 699, a compass rose, stands on the north side of Taxiway Alpha, near the intersection of Tate Road and Delalio Road near the West Patuxent Basin. Facility No. 699 consists of a circular concrete pad. This compass rose is no longer active, and at the time of survey it was being used as a storage area. Aerial photographs show faint circular directional markings on the concrete.

Facility No. 2468, a compass rose, is located on the east side of Taxiway Delta, which runs parallel to Cedar Point Road on the west side of NAS Patuxent River. It consists of a circular poured concrete pad. Facility No. 2468 is no longer in use and at the time of survey was used as a parking area for vehicles; however, aerial photographs show the faint circular directional markings on the concrete.

Historical Background and Evaluation

MARYLAND HISTORICAL TRUST REVIEW

Eligibility recommended ___ **Eligibility not recommended** ___

Criteria: ___ A ___ B ___ C ___ D **Considerations:** ___ A ___ B ___ C ___ D ___ E ___ F ___ G

MHT Comments:

_____ _____

Reviewer, Office of Preservation Services **Date**

_____ _____

Reviewer, National Register Program **Date**

The three compass roses at NAS Patuxent River are circular concrete pads that were built in 1944 as part of the runway system. Typically, a compass rose is located near the departure end of the runway and consists of a symbol painted on airfield pavement. It is used by aircraft maintenance personnel to verify the accuracy of the magnetic compass in aircraft.

The plan of NAS Patuxent River was anchored by the runway and taxiway system, with the triangular configuration made by the original runways located at the center of the tract. The three compass roses were built simultaneously with the runway and taxiway system. One compass rose (Facility No. 699) was built on the western end of the runway on Taxiway Alpha, near Seaplane Hangar 301 and the West Patuxent Basin. Another compass rose (Facility No. 698) was built near Hangar 101 near the end of Runway 20. The third compass rose (Facility No. 2468) was built on the eastern side of the runway near the end of Runway 32, directly north of Hangars 115 and 201 and the Chesapeake Bay Basin.

In 2009 the runway and taxiway system at NAS Patuxent River was determined a contributing resource to the National Register-eligible Armament Test Historic District (MIHP No. SM-900) and Flight Test Historic District (MIHP No. SM-899) at NAS Patuxent River (Baynard and Kuhn 2009). The runway and taxiway system is a significant component of NAS Patuxent River, not only in its design but also in base operations since all infrastructure was built in correlation to the position and location of the runways. The runways and taxiways were essential to the operations of both the Armament Test and the Flight Test areas of the station. Although Runway 24-6 was enlarged in 1952, the runways and taxiways retain their original configuration and their integrity of location, setting, design, materials, workmanship, association, and feeling. The runways continue to be essential to the operations of NAS Patuxent River (Baynard and Kuhn 2009).

The three compass roses at NAS Patuxent River (Facility Nos. 698, 699, and 2068) were built in conjunction with the runways and taxiways in 1944 and were essential to the operation of the airfield. Although two of the compass roses are no longer in use, their configuration remains the same as when they were constructed, they are still distinguishable as compass roses, and they retain their integrity of location, setting, design, materials, workmanship, and feeling. The compass roses on NAS Patuxent River are therefore recommended as contributing resources to both the National Register-eligible Armament Test Historic District (MIHP No. SM-900) and Flight Test Historic District (MIHP No. SM-899) as part of the runway and taxiway system.

Works Cited

Baynard, Kristie, and Patti Kuhn
2009 Landscape Survey and Evaluation, NAS Patuxent River. Prepared for Naval Air Station Patuxent River, Maryland, by The Louis Berger Group, Inc., Washington, D.C.

MARYLAND HISTORICAL TRUST REVIEW

Eligibility recommended _____ **Eligibility not recommended** _____

Criteria: ___A ___B ___C ___D **Considerations:** ___A ___B ___C ___D ___E ___F ___G

MHT Comments:

_____ _____

Reviewer, Office of Preservation Services **Date**

_____ _____

Reviewer, National Register Program **Date**

Name: SOLOMONS ISLAND
Date: 4/14/2010
Scale: 1 inch equals 2000 feet

Location: 038° 17' 09.60" N 076° 25' 24.79" W NAD 27
Caption: Facility Nos. 698, 699, 2468
SM-899

Copyright (C) 1997, Maptech, Inc.

Photo 1. Facility No. 698, looking north

Photo 2. Facility No. 699, looking northeast

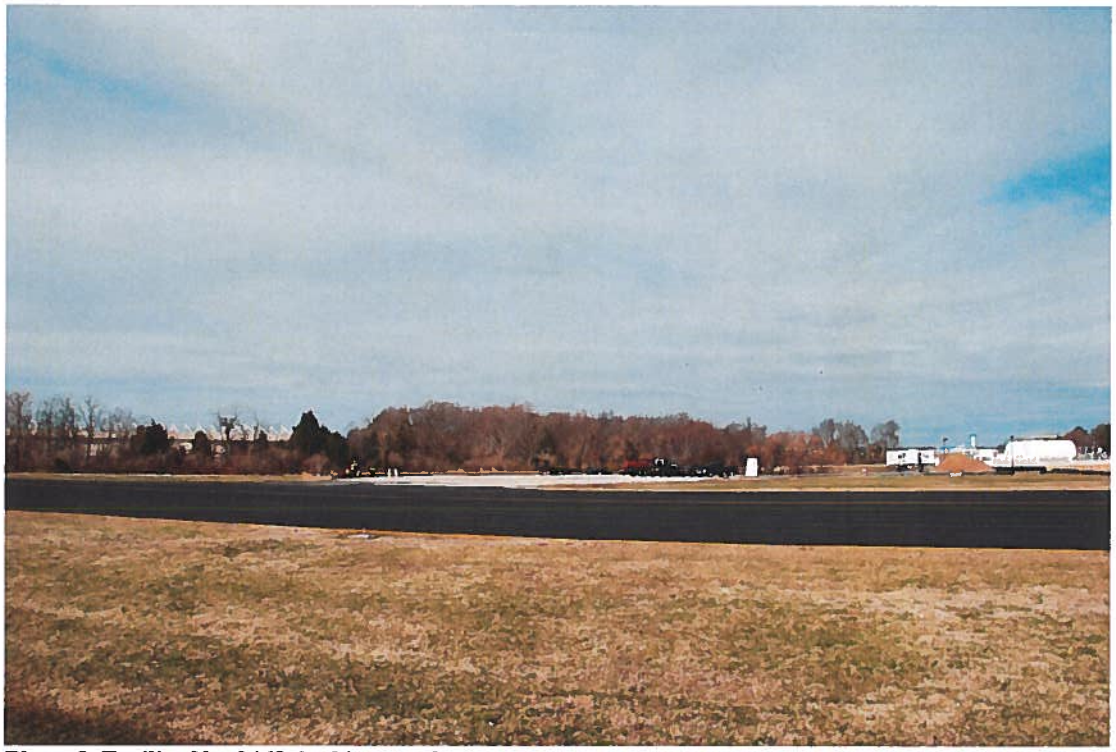


Photo 3. Facility No. 2468, looking southwest

Photograph of Compass Rose (B-2468) showing poor condition. This compass rose is proposed to be replaced.

Photograph shows the poor condition of Compass Rose B-2468. Center turntable has been removed and replaced with concrete. Most of the original 15 degree markers have been removed or destroyed.

ATTACHMENT
Hazardous Materials Assessment
Findings Report

Planning and Design
Hazardous Materials Assessment
Findings Report
June 12, 2015

FY-16 Special Project Program
Repair Runways 14-32 & 6-24 NAS Patuxent River, Patuxent River, MD
Contract N62470-12-D-2010 WO 0004

By
A/E JMT/Gannett Fleming
Joint Venture

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1.0 EXECUTIVE SUMMARY

JMT/Gannett Fleming Joint Venture (JV) Team, on behalf of the Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, Naval Air Station (NAS) Patuxent River (Pax River) has prepared this Hazardous Materials Assessment Findings Report of two electrical/lighting vaults located at 21866 Cedar Point NAS Pax River, Patuxent River, MD 20670. The locations of the vaults designated as vault E-155 and vault E-1710 assessed for this report are presented on Figures 1 and 2.

The purpose of this Findings Report is to provide a baseline inventory of existing hazardous and regulated materials of concern in the two lighting vaults prior to contracting future upgrade and renovation projects. Regulated materials of concern include asbestos containing materials (ACM), lead-containing paint (LCP), and mercury and polychlorinated biphenyl (PCB) containing equipment.

Destructive sampling techniques were limited to reasonably accessible areas with hand tools. Each suspect material sampled was collected in an inconspicuous area and reasonable attempts were made to sample observed materials to the extent possible without using aggressive sampling techniques.

Electrical and mechanical systems historically contain components that may contain ACM, LCP, mercury and PCBs. These contaminants can be found in equipment such as transformers and hydraulic systems, lead-acid batteries, fluorescent lighting tubes, thermostats, switches and relays, electrical insulation, electrical transite panels, gaskets, and valve packing. The JV Team scope of work did not include sampling these systems.

On April 19, 2015, the JV Team met with a NAVFAC escort to conduct a site reconnaissance of the two vaults. The JV Team identified materials of concern such as suspect asbestos containing materials (SACM), LCP, and potential mercury and PCB containing equipment.

ACM is identified by the United States Environmental Protection Agency (EPA) as a material composed of asbestos of any type in an amount greater than 1% by weight either alone or mixed with other fibrous or non-fibrous materials. The JV Team collected samples of SACM and submitted them to an accredited laboratory for analysis. Analytical results reported asbestos content in the samples listed in Table 1 below.

TABLE 1 – ASBESTOS-CONTAINING MATERIALS BY PLM & TEM ANALYSIS

LOCATION	SAMPLE ID#	HOMOGENEOUS MATERIAL DESCRIPTION	% ACM
Vault E-155	V155-2603-013	Roof Material	3% Chrysotile
	V155-2603-014		3% Chrysotile
	V155-2603-015		5% Chrysotile

Asbestos was confirmed in the roof material related to electrical vault E-155 but was not detected in the remaining materials sampled in this vault and in vault E-1710. Sample locations within the vaults are presented on Figures 3 and 4.

Samples collected by the JV Team were analyzed by AMA Analytical Services, Inc. (AMA) of Lanham, Maryland. AMA is accredited by the American Industrial Hygiene Association (AIHA) Laboratory Accreditation Program, the National Voluntary Laboratory Accreditation Program (NVLAP) and the National Institute of Science and Technology (NIST). The laboratory maintained current certifications during the project. The analyses were performed in accordance with the EPA protocol established for the specified analyses.

Based on the age of the vaults it is likely the original coat of paint does contain lead. The JV Team was unable to receive authorization from the base commander to use an X-Ray fluorescence (XRF) analyzer to perform on site lead paint testing and as such the JV Team collected paint chip samples for laboratory analysis. The JV Team also submitted paint samples for toxicity characteristic leaching procedure (TCLP) analysis to evaluate if the painted demolition debris would be characterized as a hazardous waste.

The current EPA (40 CFR Part 745) threshold for classifying lead-based paint is equal to or greater than 1 milligram per square centimeter (mg/cm^2) or greater than 0.5% by weight. The Occupational Safety and Health Administration (OSHA) does not define lead paint based on content. In accordance with OSHA, any detectable lead in paint defines it as LCP for the purpose of complying with OSHA regulations to determine worker exposure. Analytical results reported LCP in the samples listed in Table 2 below.

TABLE 2 – LEAD-CONTAINING PAINT BY AAS ANALYSIS

LOCATION	SAMPLE ID#	SUBSTRATE	COMPONENT	LEAD CONTENT % BY WEIGHT
E-155	V155-GRY-016	Concrete	Interior Wall	0.79%
	V155-WHT-017	Concrete	Exterior Wall	0.01%
	V155-ORG-018	Concrete	Exterior Wall	<0.011%
E-1710	V1710-WHT-022	Concrete	Exterior Wall	<0.0079%
	V1710-GRY-023	Metal	Exterior Door	0.01%

Surfaces analyzed by paint chip analysis did not meet the EPA standard of 0.5% for lead-based paint, but do contain detectable levels of lead. Paint chip sampling locations are identified on Figures 3 and 4.

The EPA threshold or regulatory level for classifying lead as a hazardous waste using toxicity characteristic leaching procedure (TCLP) analysis is 5.0 milligrams/liter (mg/L). Analytical results reported TCLP lead levels below the EPA regulatory level and are listed in Table 3 below.

TABLE 3 –HAZARDOUS WASTE CHARACTERIZATION OF LEAD BY TCLP ANALYSIS

EPA REGULATORY LIMIT	LOCATION	REPORTED CONCENTRATION
5.0 mg/L	E-155	<0.5 mg/L
	E-1710	<0.5 mg/L

PCBs were commonly used in many consumer products for industrial and commercial uses, including transformers and capacitors; electrical equipment such as voltage regulators, switches, and electromagnets; oil used in hydraulic systems; old electrical devices such as capacitors, fluorescent light ballasts, and caulking.

Mercury is a naturally occurring liquid metal. Due to its ability to conduct electricity and other properties, elemental mercury was commonly used in consumer products. Building fixtures potentially containing mercury include fluorescent lighting tubes, thermostats, switches and relays, and thermometers.

Sampling/assessing of electrical components that may contain mercury or PCBs was not included in this work scope but the JV Team did inventory equipment that may contain mercury and/or PCBs. Table 4 below represents the number of building fixtures found suspected of containing mercury and/or PCBs.

TABLE 4 – INVENTORY OF SUSPECT MERCURY AND PCB CONTAINING EQUIPMENT

VAULT	FIXTURE	QUANTITY (~)
E-155 and associated backup generator vault 1932	Light Fixtures/Ballasts	0
	Fluorescent light bulbs/tubes	0
	Thermostats/switches/relays	0
	Transformers (old)	4 (oil filled) suspect PCB containing
E-1710	Light Fixtures/Ballasts	9/27 (estimate 3 ballasts per fixture) suspect mercury containing
	Fluorescent light bulbs/tubes	18 (2 bulbs per fixture) suspect mercury containing
	Thermostats/switches/relays	0
	Transformers	0

Renovation and demolition activities associated with ACM and LCP should be conducted in accordance with federal and local rules and regulations. The contractor should provide appropriate health and safety protocols to address work associated with LCP as per the OSHA 29

CFR 1926.62-Lead, OSHA 29 CFR 1926.1101-Asbestos, as well as EPA 40 CFR 61 Subpart M-NESHAP Asbestos.

2.0 INTRODUCTION

JMT/Gannett Fleming Joint Venture (JV), on behalf of the Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, Naval Air Station (NAS) Patuxent River has prepared this Hazardous Materials Assessment Findings Report of two electrical/lighting vaults designated as vaults E-155 and vault E-1710 located at 21866 Cedar Point NAS Pax River, Patuxent River, MD 20670.

This report was prepared in general accordance with the *Planning and Design Environmental Site Specific Work Plan,* dated February 17, 2015 and scope of work as per Contract *Repair Runways 14-32 & 6-24 N62470-12-D-2010 Task Order 004.*

The purpose of this Findings Report is to provide a baseline inventory of existing regulated materials prior to contracting future station upgrades and renovation projects. Regulated materials of concern include asbestos containing materials (ACM), lead-containing paint (LCP), and mercury and polychlorinated biphenyl (PCB) containing equipment.

This Findings Report includes:

- Historical background and physical site conditions;
- The collection of asbestos bulk samples;
- The collection of paint chip samples;
- Inventory of mercury and PCB containing equipment;
- Sampling methodology and quality assurance and quality control procedures;
- Analytical results; and
- Findings.

3.0 SITE ACTIVITES

3.1 Site Location and Description

NAS Pax River is the United States Navy's headquarters to the Naval Air Systems Command, houses the Naval Air Warfare Center Aircraft Division, and hosts the United States Naval Test Pilot School.

The site is located on a peninsula between Patuxent River and the Chesapeake Bay. The site is approximately 14,500 acres and spans across St. Mary's and Calvert counties in the state of Maryland. NAS Pax River is located approximately at latitude 38°17'0.49" north and longitude 76°25'22.89" "west. A Site Location Map is presented as Figure 1.

3.2 Site Activities

On April 19, 2015, the JV Team met with a NAVFAC escort to conduct a site reconnaissance of the two electrical/lighting vaults. The JV Team completed a visual assessment of two vaults for suspect asbestos containing material (SACM), suspect LCP, and inventory of suspect mercury and PCB containing equipment Vault E-155 is supported by a backup generator vault adjacent to the electrical vault. This vault is identified as 1932, and was included in the assessment of electrical/lighting vault E-155. A backup generator vault also supports electrical/lighting vault E-1710 but it is an attached structure and was included in the assessment of vault E-1710.

3.3 Asbestos Containing Materials

Asbestos is commonly used in a variety of building construction materials such as vinyl floor tile, mastic, thermal insulation, fireproofing, as well as many other applications for its strong durability and fire resistant properties. ACM is identified by the EPA as a material composed of asbestos of any type in an amount greater than 1% by weight either alone or mixed with other

fibrous or non-fibrous materials. There are three basic types of asbestos used in building materials:

- Surfacing Material that is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceilings, fireproofing materials on structural members, or other materials for acoustical, fireproofing or decorative purposes.
- Thermal System Insulation applied to pipes, fittings, boilers, breaching, tanks, ducts, or other structural components to prevent heat loss or gain, water condensation, or for other purposes.
- Miscellaneous building materials on structural components, structural members or fixtures such as floor and ceiling tile, transite panels, transite pipe, roofing shingles, roof flashing, tar, and many other materials that are exclusive of surfacing or thermal insulation.

3.3.1 Limitations

Destructive sampling was limited to reasonably accessible areas with hand tools to the extent possible. Electrical and mechanical systems historically contain components that may be asbestos containing such as electrical wiring insulation, electrical transite panels, gaskets, and valve packing. The JV Team did not conduct destructive sampling of these systems. SACM that was not reasonably accessible should be addressed during construction activities.

3.3.2 Asbestos Assessment Activities

Asbestos sampling activities were conducted in conformance with the EPA, Guidance for Controlling Asbestos Containing Materials in Buildings, Office of Pesticides and Toxic Substances, Doc 560/5-85-024, 40 Code of Federal Regulations (CFR) Part 763, Asbestos Regulated Emergency Response Act (AHERA) and the State of Maryland Department of the Environment (MDE). MDE Licenses and certifications are presented in Appendix A.

The JV Team collected information during a visual inspection and identified SACM. SACM was identified by homogeneity and grouped according to functional spaces (spatially distinct units within a vault. The inspector inventoried the SACM and recorded the location, description, and reasonably accessible quantity of suspect materials.

A homogeneous material is defined in 40 CFR Part 763 as *an area of surfacing material, thermal system insulation material, or miscellaneous material that is uniform in color and texture*. The delineation of homogeneous materials was based on the criteria of color, texture, location and type of material. A minimum of three bulk samples were collected of each homogeneous material identified as per 40 CFR Part 763. The number of samples collected were dictated by the quantity of homogeneous materials present as per 40 CFR Part 763.

Materials of concern identified in assessed areas included the following:

- Caulk
- Window glazing
- Expansion Joint
- Mortar
- Roof materials

The materials listed above are defined as miscellaneous materials and as such, a minimum of three randomly distributed samples were collected for each miscellaneous homogeneous material identified.

3.3.3 Analytical Methods

Samples were analyzed using polarized light microscopy (PLM) by EPA Method EPA/600/R-93/116, *Method for the Determination of Asbestos in Bulk Building Materials.* This procedure is recommended by EPA for determining the presence of asbestos in building materials, such as pipe and boiler insulation, acoustical coatings, spray-on fireproofing, plasters, ceiling tiles, and floor tiles. The PLM procedure involves taking a small amount of the suspect material, isolating the fibers present, and identifying them based on the crystalline properties observed. In addition, non-asbestos fibrous materials can also be identified including glass, mineral wool, cellulose, gypsum and synthetic fibers. If analytical results were deemed inconclusive by the PLM method, bulk samples were analyzed by transmission electron microscopy (TEM) to confirm the presence of asbestos fibers. The results of the analysis are reported as a percentage of the total sample. Laboratory analysis and chain-of-custody are presented in Appendix B.

3.4 Lead-Containing Paint

Lead is a naturally occurring heavy metal. Due to its durability, lead was commonly used in paint and rechargeable lead-acid storage batteries. In 1978, the United States government banned the use of lead-based paint in households. Although lead-based paint for residential use was banned in 1978, LCP was still being used in commercial and industrial applications. The JV Team collected information during a visual assessment by a State of Maryland lead risk assessor. The risk assessor inventoried coated surfaces and recorded the room location, component, and color. Coated surfaces of concern included:

- Painted walls
- Painted doors/door jambs
- Painted windows

The JV Team was unable to receive authorization from the base commander to use an X-Ray fluorescence (XRF) analyzer to perform on-site lead testing and as such the JV Team collected paint chip samples for laboratory analysis in accordance with the EPA 40 CFR Part 745 and OSHA 29 CFR 1926.62. Licenses and certifications are presented in Appendix A.

Paint chip samples were analyzed by EPA Method 7000B/3050B-Flame Atomic Absorption Spectrophotometry. The JV Team also collected representative samples of potential demolition debris with lead paint. Samples were analyzed by toxicity characteristic leaching procedure (TCLP) EPA Method 7000B/1311 by a certified environmental laboratory accredited by the American Industrial Hygiene Association (AIHA) Laboratory Accreditation Program, the National Voluntary Laboratory Accreditation Program (NVLAP) and the National Institute of Science and Technology (NIST). Laboratory analytical results and chain-of-custody records are presented in Appendix C.

3.5 Inventory of Mercury and PCB Containing Equipment

The JV Team conducted a visual inventory of the two electrical/lighting vaults to identify mercury and PCB containing equipment.

PCBs are manmade organic chlorinated hydrocarbon chemicals. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were commonly used in many consumer products for industrial and commercial uses including transformers and capacitors, electrical equipment including voltage regulators, switches, and electromagnets, oil used hydraulic systems, old electrical devices containing PCB capacitors, and fluorescent light ballasts. Manufacturing of PCBs was banned in the United States in 1979.

Mercury is a naturally occurring liquid metal. Due to its ability to conduct electricity and other properties, elemental mercury was commonly used in consumer products. Building fixtures potentially containing mercury include fluorescent lighting tubes, thermostats, switches and relays, and thermometers.

Sampling/assessing of electrical components that may contain mercury or PCBs was not included in this work scope but the JV did inventory equipment that may contain mercury and/or PCBs. Table 5 below represents the number of building fixtures found suspected of containing mercury and/or PCBs.

TABLE 5 – INVENTORY OF SUSPECT MERCURY AND PCB CONTAINING EQUIPMENT

VAULT	FIXTURE	QUANTITY (~)
E-155 and associated backup generator vault 1932	Light Fixtures/Ballasts	0
	Fluorescent light bulbs/tubes	0
	Thermostats/switches/relays	0
	Transformers (old)	4 (oil filled) suspect PCB containing
E-1710	Light Fixtures/Ballasts	9/27 (estimate 3 ballasts per fixture) suspect mercury containing
	Fluorescent light bulbs/tubes	18 (2 bulbs per fixture) suspect mercury containing

VAULT	FIXTURE	QUANTITY (~)
E-1710	Thermostats/switches/relays	9/27 (estimate 3 ballasts per fixture) suspect mercury containing
	Transformers	18 (2 bulbs per fixture) suspect mercury containing

3.6 Photo Documentation

Photo documentation of materials sampled using a digital camera is provided in Appendix D.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC) PROCEDURES

The data obtained from the samples collected at the subject site was used to provide information to satisfy the data quality objective (DQO) of this Hazardous Materials Assessment Findings Report.

DQOs are based on the concept that different data uses may require different levels of data quality. DQOs are defined with respect to the types, number, and locations of samples that will be collected, and the QA levels associated with the analysis. Building materials were collected and analyzed for asbestos and lead.

The overall QA objective is to develop and implement procedures for field measurements, sampling, and analytical testing that provide data of known quality that is consistent with the intended use of the information. This section defines the objectives by (1) describing the use of the data (2) specifying the applicable QC effort (field checks and analytical support levels), and (3) defining the QC objectives (data quality acceptance criteria).

4.1 Data Usage and Requirements

The laboratory analyses were used to support the assessment process. The intended use of the data from the sample collection was to identify asbestos and lead content. The data included quantitative laboratory analyses.

Quantification limits for the laboratory analyses are in conformance with the appropriate EPA methodology for the specified analyses.

4.2 Sampling Methodology

4.2.1 Decontamination of Sampling Equipment

Non-dedicated sampling equipment was decontaminated prior to and following sample collection using a phosphate-free detergent wash and then rinsed with water.

4.2.2 Sample Packaging and Shipment

Samples were shipped to the laboratory following completion of the sampling activities. Custody of the samples was maintained through the shipment of samples to the laboratory. Samples were in the custody of the sampling crew until relinquished directly to AMA Analytical Services, Inc. (AMA). A Chain-of-Custody record accompanied the samples and documented personnel handling samples from sample collection to laboratory.

4.2.3 Field Custody Procedures

Sample custody during the investigation was completed encompassing sample collection, packaging, field custody procedures, sample shipment, method of shipment, and date and time documentation. Sample custody was conducted to provide that:

- All samples were uniquely identified;
- The correct samples were tested and traceable to their source;
- Samples were protected from loss or damage; and
- A record of sample custody and integrity was established and maintained through the entire custody process.

All samples collected from the site were identified with a sample label and recorded on a chain-of-custody form. Indelible ink was used to complete sample labels.

4.2.4 Chain-of-Custody Record

The chain-of-custody provides an accurate written record that can be used to trace the possession and handling of the samples from the time of collection to analysis. The chain-of-custody form

was completed for each sample at the time of collection and was maintained while shipping the samples to the laboratory. The following information was entered on the chain-of-custody form:

- Project number
- Project name
- Signature of sampler
- Sample number
- Description of sample
- Date
- Parameters for analysis
- Remarks, as needed.

4.2.5 Analytical Procedures

Samples were analyzed by AMA of Lanham, Maryland accredited by the American Industrial Hygiene Association (AIHA) Laboratory Accreditation Program, the National Voluntary Laboratory Accreditation Program (NVLAP) and the National Institute of Science and Technology (NIST). The laboratory maintained current certifications during the project. All analyses were performed in accordance with the EPA protocol established for the specified analyses.

4.2.6 Data Reduction and Reporting

Data collected during the regulated hazardous materials assessment, including field and laboratory results, were reduced, reviewed, summarized, and reported. The laboratory data were reduced and tabulated electronically. The reduced data are suitable for inclusion in reports and designed to facilitate comparison and evaluation of the results.

5.0 ANALYTICAL RESULTS

5.1 Asbestos Analytical Results

The EPA and OSHA define ACM as any material containing greater than one percent (1%) of asbestos. Analytical results that indicated greater than 1% of asbestos in samples collected are listed in Table 6 below in **bold**.

TABLE 6 – ASBESTOS CONTAINING MATERIAL SAMPLES COLLECTED

LOCATION	SAMPLE ID#	HOMOGENEOUS MATERIAL DESCRIPTION	%ACM
Vault E-155	V155-2600-001	Window Glazing	NAD
	V155-2600-002		NAD
	V155-2600-003		NAD
	V155-2601-004	Window Glazing	NAD
	V155-2601-005		NAD
	V155-2601-006		NAD
	V155-2602-007	Window Pane Glazing	Trace <1%
	V155-2602-008		NAD
	V155-2602-009		NAD
Generator Room-1932	V1932-0200-010	Mortar associated with CMU	NAD
	V1932-0200-011		NAD
	V1932-0200-012		NAD
Vault E-155	**V155-2603-013**	**Roof Material**	**3% Chrysotile**
	V155-2603-014		**3% Chrysotile**
	V155-2603-015		**5% Chrysotile**
Vault E-1710	V1710-1600-001	Caulk associated with Louvers	TR
	V1710-1600-002		NAD
	V1710-1600-003		NAD
	V1710-2600-004	Glazing associated with Exterior Windows	NAD
	V1710-2600-005		NAD
	V1710-2600-006		NAD
	V1710-1601-007	Window Caulk	NAD
	V1710-1601-008		NAD
	V1710-1601-009		NAD

LOCATION	SAMPLE ID#	HOMOGENEOUS MATERIAL DESCRIPTION	%ACM
Vault E-1710	V1710-2400-010	Expansion Joint	TR
	V1710-2400-011		NAD
	V1710-2400-012		NAD
	V1710-1602-013	Caulk associated with Exterior Door	TR
	V1710-1602-014		NAD
	V1710-1602-015		NAD
	V1710-2601-016	Mortar associated with CMU	NAD
	V1710-2601-017		NAD
	V1710-2601-018		NAD
	V1710-2602-019	Roof Material	NAD
	V1710-2602-020		NAD
	V1710-2602-021		NAD

ACM denoted in **Bold**
NAD- No Asbestos Detected
TR – Trace equals less than 1%

5.2 Paint Chip Analysis Results

Paint chip samples were analyzed for lead content. Analytical results are presented in Table 7 below.

TABLE 7 – PAINT CHIP SAMPLES COLLECTED

LOCATION	SAMPLE ID#	SUBSTRATE	COMPONENT	LEAD CONTENT PERCENT BY WEIGHT
E-155	V155-GRY-016	Concrete	Interior Wall	0.79%
	V155-WHT-017	Concrete	Exterior Wall	0.01%
	V155-ORG-018	Concrete	Exterior Wall	<0.011%
E-1710	V1710-WHT-022	Concrete	Exterior Wall	<0.0079%
	V1710-GRY-023	Metal	Exterior Door	0.01%

5.3 TCLP Analysis Results

The EPA threshold or regulatory level for classifying lead as a hazardous waste using TLCP analysis is 5.0 milligrams/liter (mg/l). Select composite paint samples were analyzed for TCLP lead analysis. Analytical results are presented in Table 8 below.

TABLE 8 –HAZARDOUS WASTE CHARACTERIZATION SAMLPLES COLLECTED

EPA REGULATORY LIMIT	LOCATION	REPORTED CONCENTRATION (mg/L)
5.0 mg/L	Vault E 155	<0.5
	Vault E-1710	<0.5

6.0 FINDINGS

The flowing is a summary of our findings:

Analytical results reported asbestos in the roof material related to vault E-155.

Analytical results reported did not meet the EPA standard (40 CFR Part 745) for lead-based paint but do contain lead and meet the OSHA standard (29 CFR 1926.62) for LCP.

Analytical results did not report TCLP concentrations of lead exceeding the EPA hazardous waste characteristics threshold or regulatory level.

Sampling/assessing of electrical components that may contain mercury or PCBs was not included in this work scope but the JV Team did inventory equipment that may containing mercury and/or PCBs. Table 9 represents the number of building fixtures found suspected of containing mercury and/or PCBs.

TABLE 9 – INVETORY OF SUSPECT MERCURY AND PCB CONTAINING EQUIPMENT

VAULT	FIXTURE	QUANTITY (~)
E-155 and associated backup generator vault 1932	Light Fixtures/Ballasts	0
	Fluorescent light bulbs/tubes	0
	Thermostats /switches/relays	0
	Transformers (old)	4 (oil filled) suspect PCB containing
E-1710	Light Fixtures/Ballasts	9/27 (estimate 3 ballasts per fixture) suspect mercury containing
	Fluorescent light bulbs/tubes	18 (2 bulbs per fixture) suspect mercury containing
	Thermostats /switches/relays	0
	Transformers	0

Renovation and demolition activities associated with LCP, ACM and related suspect hazardous materials identified in this report must be conducted in accordance with Federal, State of

Maryland, and local rules and regulations. The contractor must provide appropriate health and safety protocols to address work associated with the following regulations but not limited to:

- LCP as per the OSHA 29 CFR 1926.62-Lead;
- OSHA 29 CFR 1926.1101-Asbestos;
- EPA 40 CFR 61 Subpart M-NESHAP Asbestos as well as;
- PCB bulk waste as per 40 CFR Part 761.32 of the Toxic Substances Control Act (TSCA);
- Mercury and lead bulk waste as per Resource Conservation and Recovery Act (RCRA) regulations; and
- State of Maryland rules and regulations.

FIGURES

1,000 500 0 1,000 2,000 3,000 4,000 Feet

300 150 0 300 600 900 1,200 Meters

Source: Solomons Island, MD Quadrangle (USGS 1987)

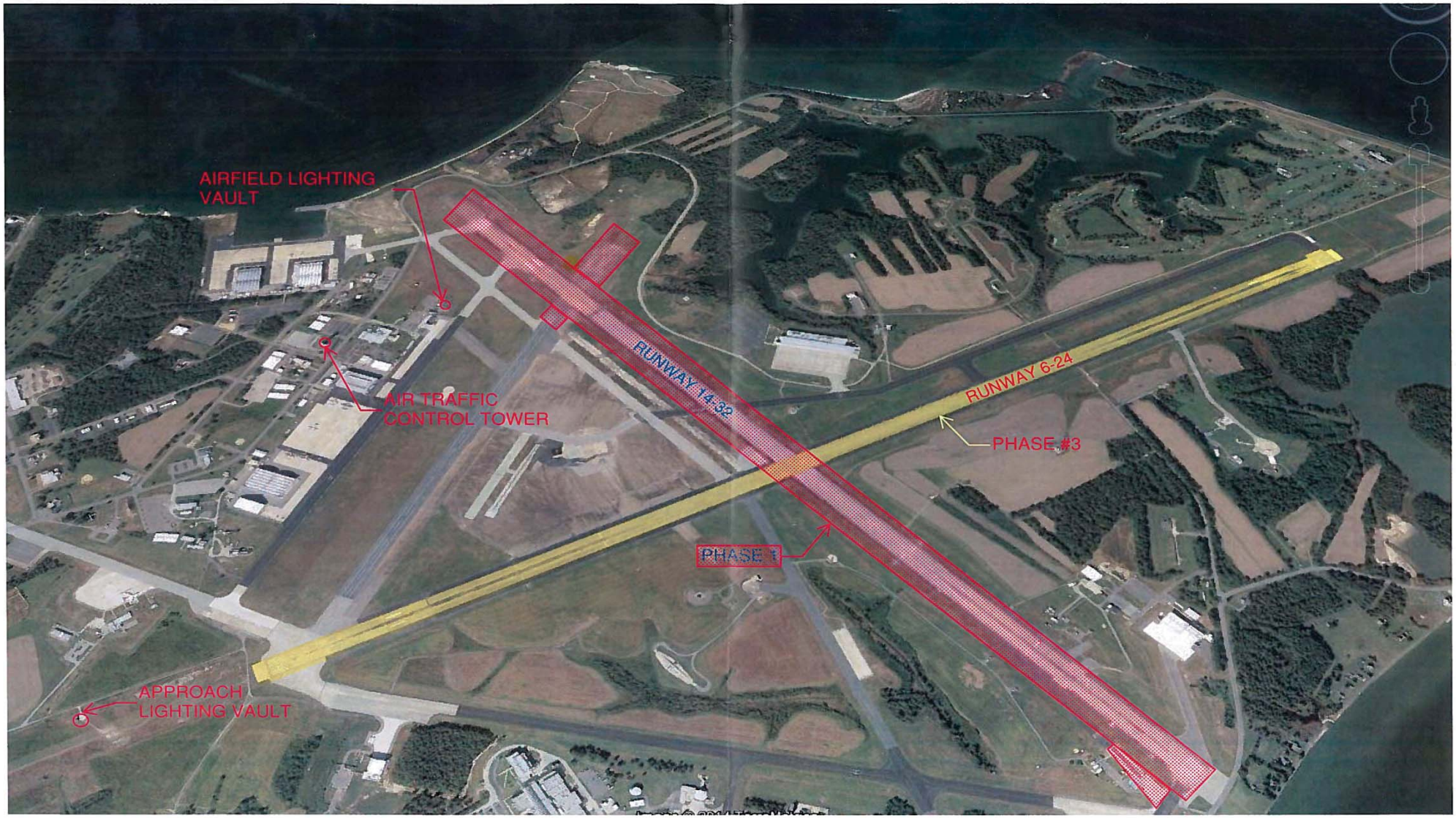
FIGURE 1

SITE LOCATION MAP

Scale = 1:24,000
November 2014

Gannett Fleming

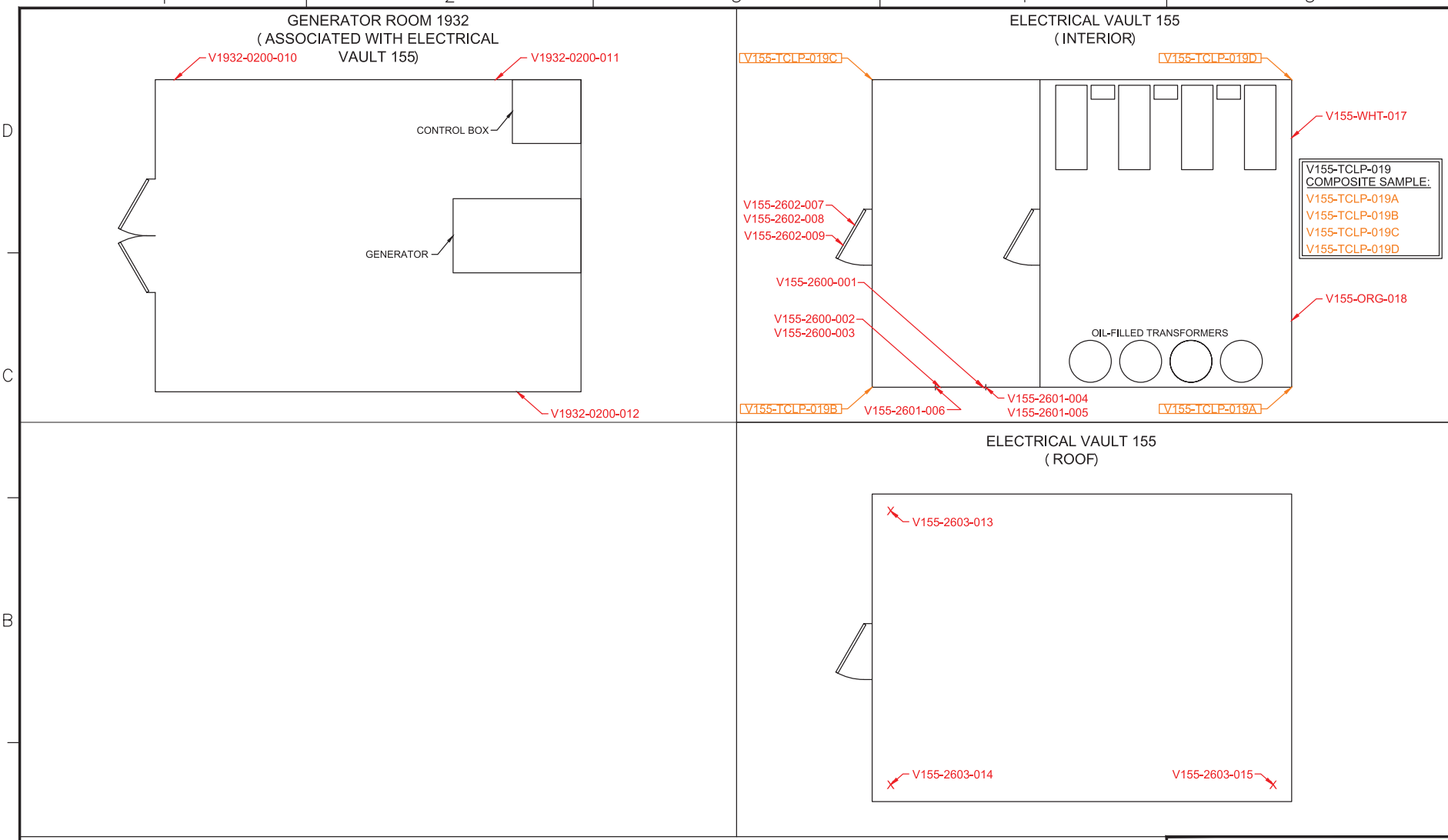
Figure 2



Patuxent River Naval Air Station
Patuxent River, Maryland
Site Plan

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

Gannett Fleming



LEGEND

08-5-2014-1 _____ ASBESTOS SAMPLING LOCATION

V155-TCLP-019 COMPOSITE SAMPLE

GRAPHIC SCALE

DRAWING IS NOT TO SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

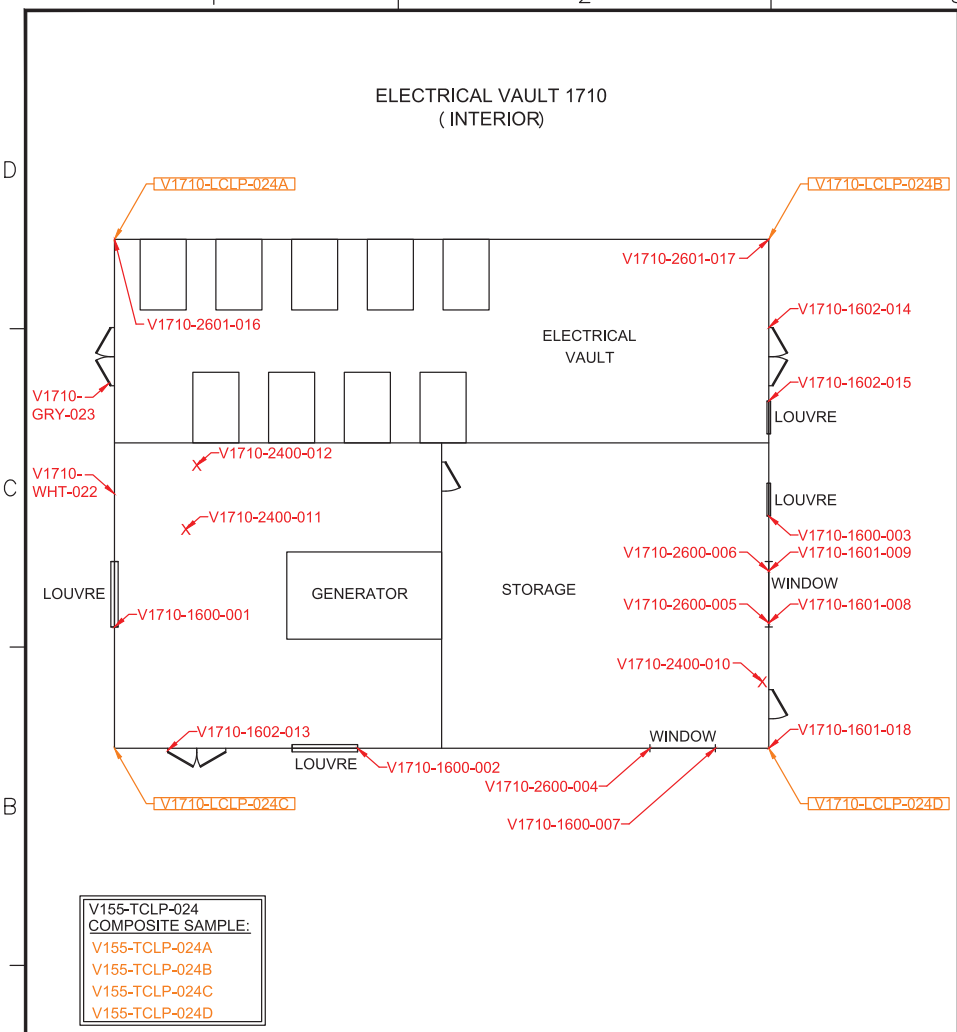
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND – MID-ATLANTIC
NAVAL AIR STATION PATUXENT RIVER – PATUXENT RIVER, MD

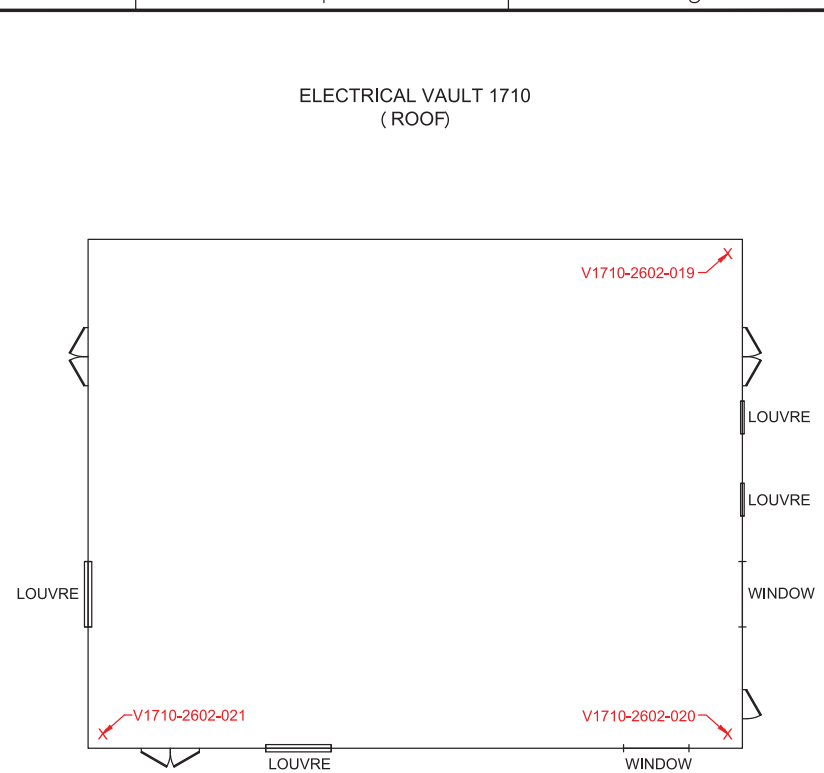
DEPARTMENT OF THE NAVY
NAVAL AIR STATION PATUXENT RIVER
PATUXENT RIVER, MD

SCALE:
EPROJECT NO.: ########
CONSTR. CONTR. NO.
######-##-#-####
VAULT E-155
SAMPLE LOCATION PLAN
SHEET OF ##

FIGURE 3

DRAWFORM REVISION: 10 JUNE 2015





LEGEND

08-5-2014-1 _____ ASBESTOS SAMPLING LOCATION

V155-TCLP-019 COMPOSITE SAMPLE

GRAPHIC SCALE

DRAWING IS NOT TO SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND - MID-ATLANTIC
NAVAL AIR STATION PATUXENT RIVER - PATUXENT RIVER, MARYLAND

NAVAL AIR STATION PATUXENT
PATUXENT RIVER, MD

SCALE:
EPROJECT NO.: ########
CONSTR. CONTR. NO.
#####-##-#-####
VAULT E-1710
SAMPLE LOCATION PLAN
SHEET OF ##

FIGURE 4

DRAWFORM REVISION: 10 JUNE 2015

APPENDIX A

ASBESTOS AND LEAD LICENSES AND CERTIFICATIONS

Section Omitted

APPENDIX B

ASBESTOS LABORATORY ANALYSIS AND CHAIN-OF-CUSTODY DATA

Section Omitted

APPENDIX C

LEAD LABORATORY ANALYSIS AND CHAIN-OF-CUSTODY

Section Omitted

APPENDIX D

PHOTO LOG

NAVAL FACILITIES ENGINEERING COMMAND
NAVAL AIR STATION PATUXENT RIVER
HAZARDOUS MATERIALS ASSESSMENT PHOTO LOG
PATUXENT RIVER, MD

Suspect Asbestos-Containing Materials

Vault E-155

2600 – Window Glazing

2601 – Window Pane Glazing

0200 – Mortar associated with CMU

2603 – Roofing Material

Suspect Lead-Containing Paint

WHT - White Paint

ORG – Orange Paint

NAVAL FACILITIES ENGINEERING COMMAND
NAVAL AIR STATION PATUXENT RIVER
HAZARDOUS MATERIALS ASSESSMENT PHOTO LOG
PATUXENT RIVER, MD

Suspect Mercury and PCB Containing Equipment
Vault E-155 - Interior Vault View
Oil filled Transformers and associated equipment
Light Ballast, Florescent Tubes Mercury switches Not Observed

Electrical Vault Entrance

Transformers Filled with Oil

Electrical Vault Transformer connection lines

NAVAL FACILITIES ENGINEERING COMMAND
NAVAL AIR STATION PATUXENT RIVER
HAZARDOUS MATERIALS ASSESSMENT PHOTO LOG
PATUXENT RIVER, MD

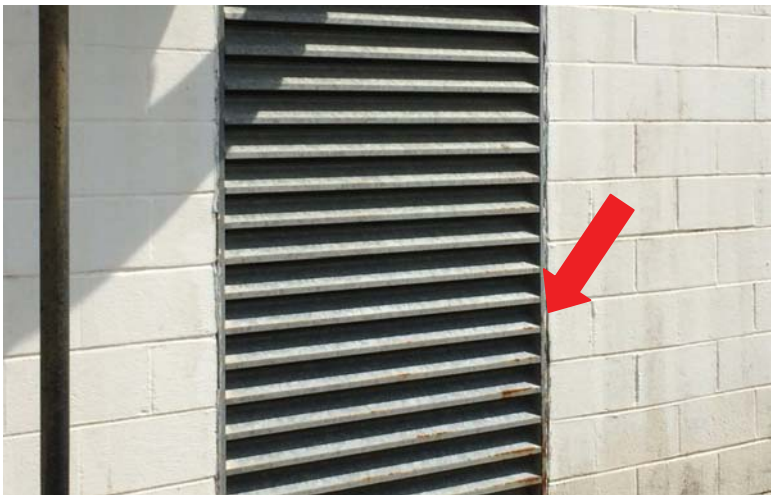
Generator Room 1932 associated with Vault E-155 - Interior Vault View
Oil filled Transformers and associated equipment Not Observed
Light Ballast, Florescent Tubes Mercury switches Not Observed

Generator Room

Generator Room

Suspect Asbestos-Containing Materials

Vault E-1710



1600 – Caulk Associated with Louvers

2600 – Glazing associated with Windows

1601 – Caulk associated with Windows

2400 – Expansion Joint associated with Concrete Floor Slab

1602 – Caulk associated with Exterior Door

2601 – Mortar associated with CMU

2602 – Roof Material

Suspect Lead-Containing Paint

WHT – White Paint

GRY – Grey Paint

NAVAL FACILITIES ENGINEERING COMMAND
NAVAL AIR STATION PATUXENT RIVER
HAZARDOUS MATERIALS ASSESSMENT PHOTO LOG
PATUXENT RIVER, MD

Suspect Mercury and PCB Containing Equipment
Vault E-1710 - Interior Vault View
Oil filled Transformers and associated equipment Not Observed
Light Ballast, Florescent Tubes Observed
Mercury switches Not Observed

Storage Room

Generator Room

Generator Room

Electrical Vault

SECTION 01 57 19.01 20

SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS
11/15

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1.2 MID-ATLANTIC

Comply with the following state, regional, and local requirements which supplement Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

1.2.1 Maryland

a. Patuxent River

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 58 00

PROJECT IDENTIFICATION
08/09

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA C1	(2003) All Timber Products - Preservative Treatment by Pressure Processes
AWPA C2	(2003) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes

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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

preliminary drawing indicating layout and text content; G

1.3 PROJECT SIGN

Prior to initiating any work on site, provide one project identification sign at the location as provided by the Contracting Officer. Construct the sign in accordance with Project Sign Details, which can be downloaded at: http://www.wbdg.org/ccb/NAVGRAPH/graphtoc.pdf. Maintain sign throughout the life of the project. Upon completion of the project, remove the sign from the site.

1.3.1 Project Identification Signboard (Navy)

A project identification signboard shall be provided in accordance with attached Plates 1, 3, and 4. Provide preliminary drawing indicating layout and text content.The signboard shall be provided at a conspicuous location on the job site where directed by the Contracting Officer.

a. The field of the sign shall consist of a 4 by 8 foot sheet of grade B-B medium density overlaid exterior plywood.

b. Lumber shall be B or better Southern pine, pressure-preservative treated in accordance with AWPA C1 and AWPA C2. Nails shall be

aluminum or galvanized steel.

c. The entire signboard and supports shall be given one coat of exterior alkyd primer and two coats of exterior alkyd enamel paint. The lettering and sign work shall be performed by a skilled sign painter using paint known in the trade as bulletin colors. The colors, lettering sizes, and lettering styles shall be as indicated. Where preservative-treated lumber is required, utilize only cured pressure-treated wood which has had the chemicals leached from the surface of the wood prior to painting.

d. Use spray applied automotive quality high gloss acrylic white enamel paint as background for the NAVFAC logo. NAVFAC logo shall be an applied 2 mil film sticker/decal with either transparent or white background or paint the logo by stencil onto the sign. The weather resistant sticker/decal film shall be rated for a minimum of 2-year exterior vertical exposure. The self-adhering sticker shall be mounted to the sign with pressure sensitive, permanent acrylic adhesive. Shop cut sticker/decal to rectangular shape and provide pull-off backing sheet on adhesive side of design sticker for shipping.

e. Sign paint colors (manufacturer's numbers/types listed below for color identification only)

(1) Blue = To match dark blue color in the NAVFAC logo.

(2) White = To match Brilliant White color in the NAVFAC logo.

f. NAVFAC logo must retain proportions and design integrity. NAVFAC logos in electronic format may be obtained from the NAVFAC web portal via the following link:
https://portal.navfac.navy.mil/portal/page?_pageid=181,3465071&_dad=portal&_schema=p
Use the following to choose color values for the paint to be used:

(1) Dark Blue = equivalent to CMYK values 100, 72, 0, 8 .

(2) Light Blue = equivalent to CMYK values 69, 34, 0, 0.

(3) Cyan = equivalent to CMYK values 100, 9, 0, 6.

(4) Yellow = equivalent to CMYK values 0.9,94, 0.

PART 2 PRODUCTS

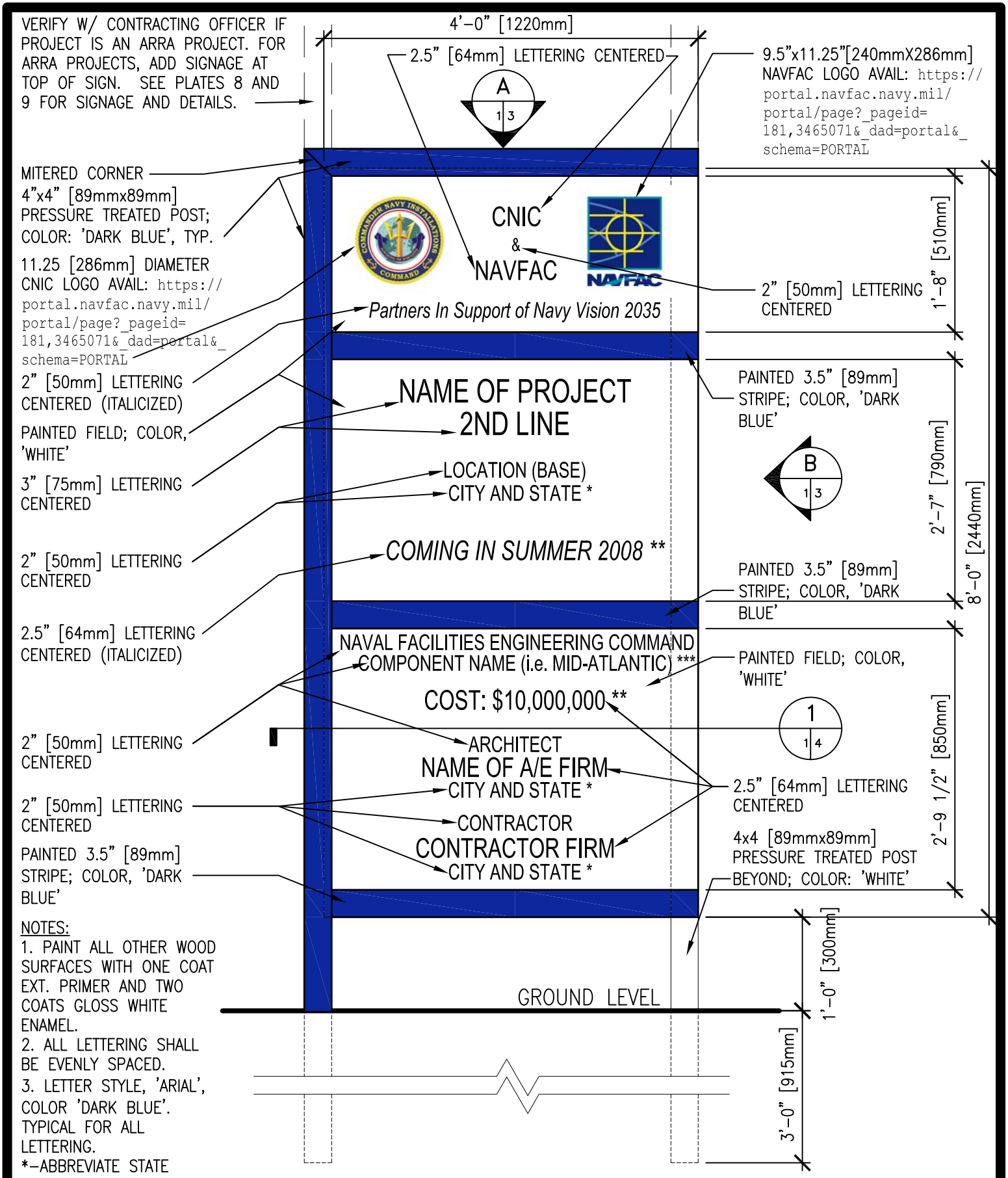
Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

ATTACHMENT
PROJECT SIGN PLATES



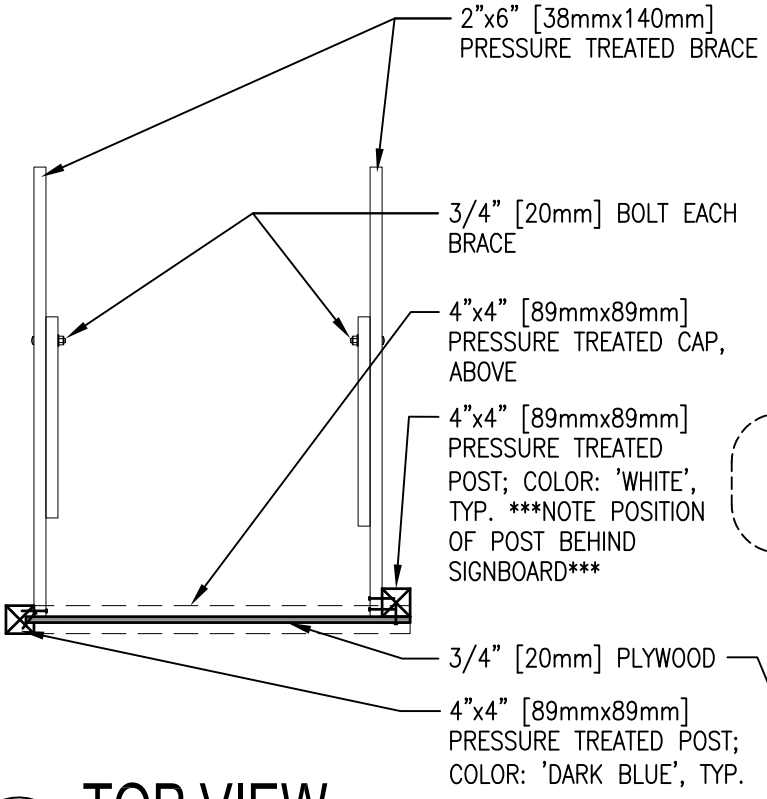
NOTES:
1. PAINT ALL OTHER WOOD SURFACES WITH ONE COAT EXT. PRIMER AND TWO COATS GLOSS WHITE ENAMEL.
2. ALL LETTERING SHALL BE EVENLY SPACED.
3. LETTER STYLE, 'ARIAL', COLOR 'DARK BLUE'. TYPICAL FOR ALL LETTERING.

*–ABBREVIATE STATE
**–CONFIRM USE WITH CONTRACTING OFFICER
***–VERIFY NAME WITH CONTRACTING OFFICER.

PROJECT IDENTIFICATION SIGNBOARD

SCALE: 3/4" = 1'-0"

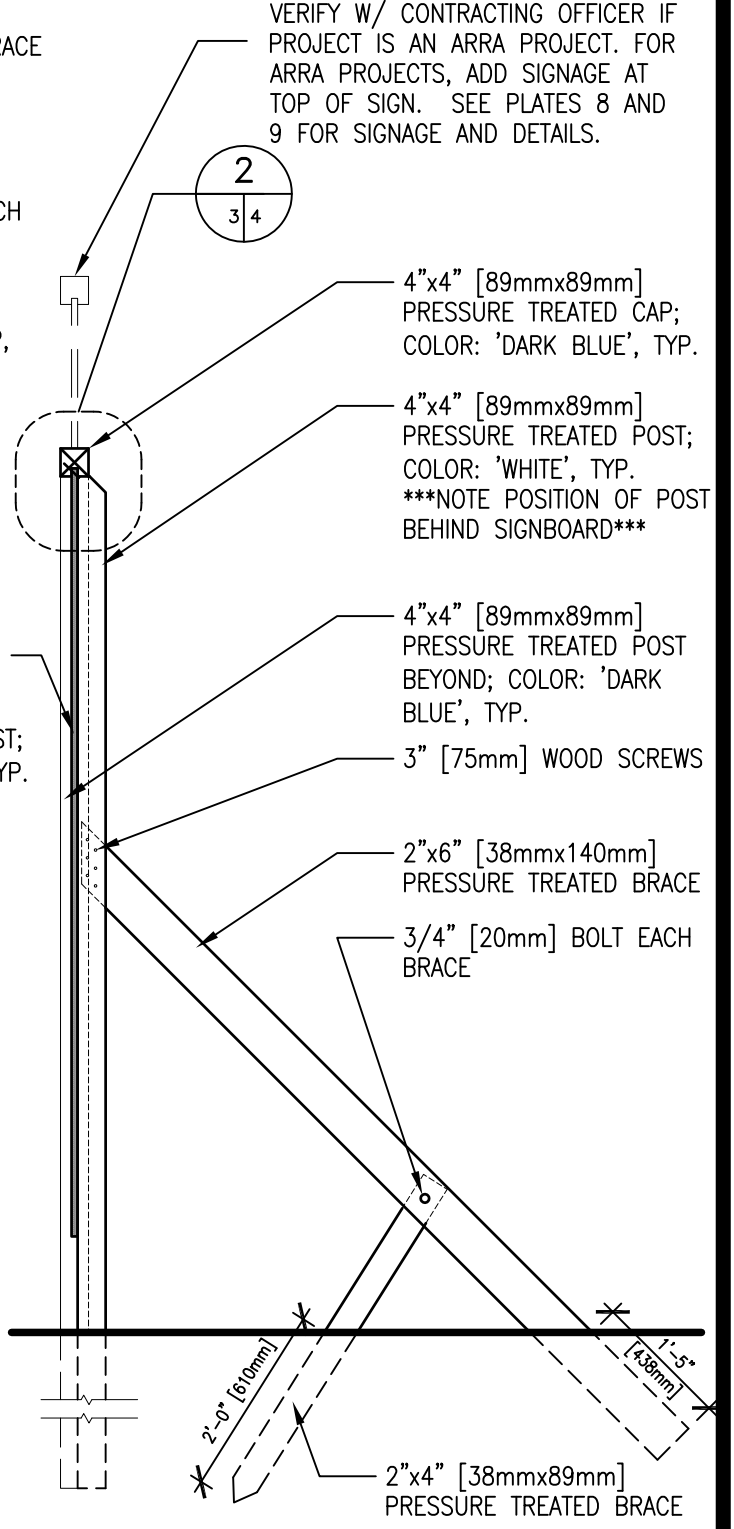
PLATE 1



A 1,2 3 **TOP VIEW**

SCALE: 1/2" = 1'-0"

NOTES:
1. POSTS AND BRACES SHALL BE PRESSURE TREATED.
2. ALL FASTENERS SHALL BE ZINC COATED.
3. BRACING IS REQUIRED IN ALL SOIL CONDITIONS AND HIGH WIND ENVIRONMENTS.

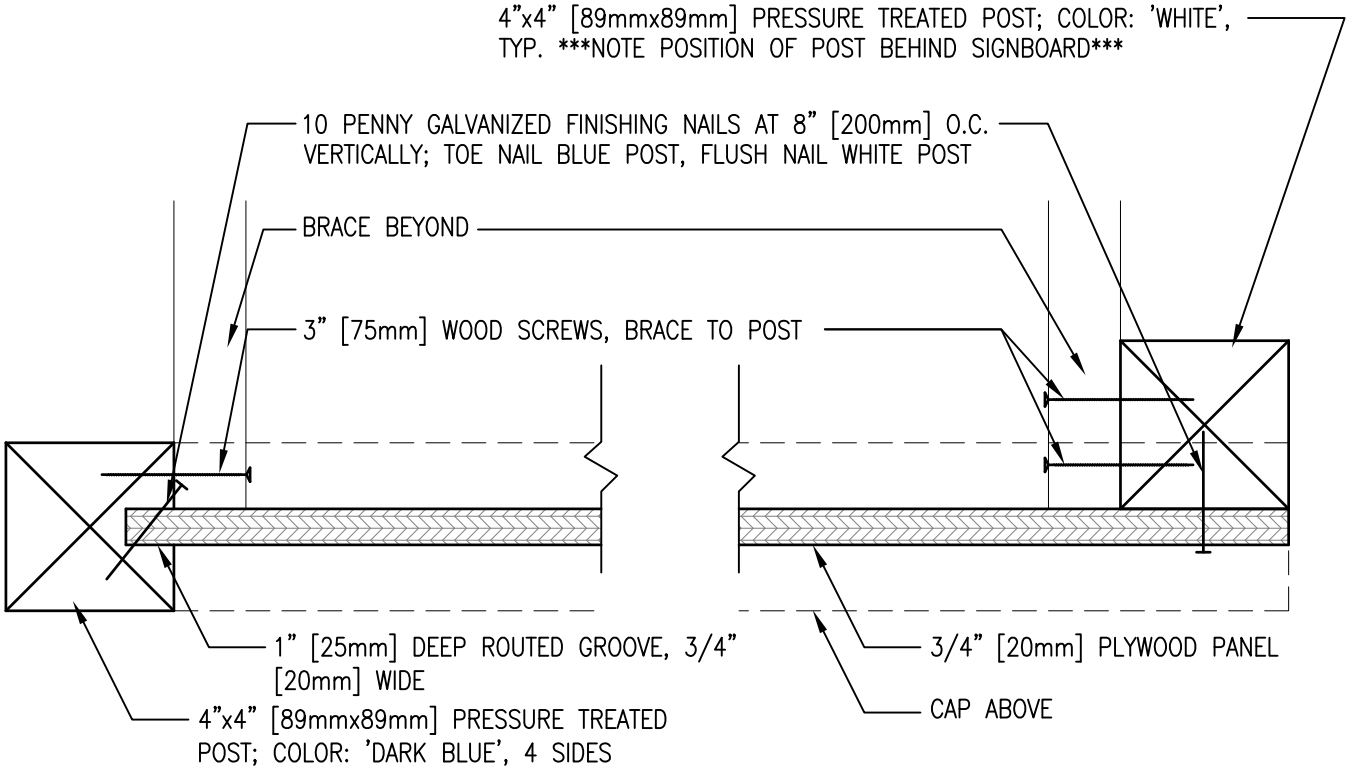


B 1,2 3 **SIDE VIEW**

SCALE: 1/2" = 1'-0"

PROJECT IDENTIFICATION SIGNBOARD SUPPORT DETAILS

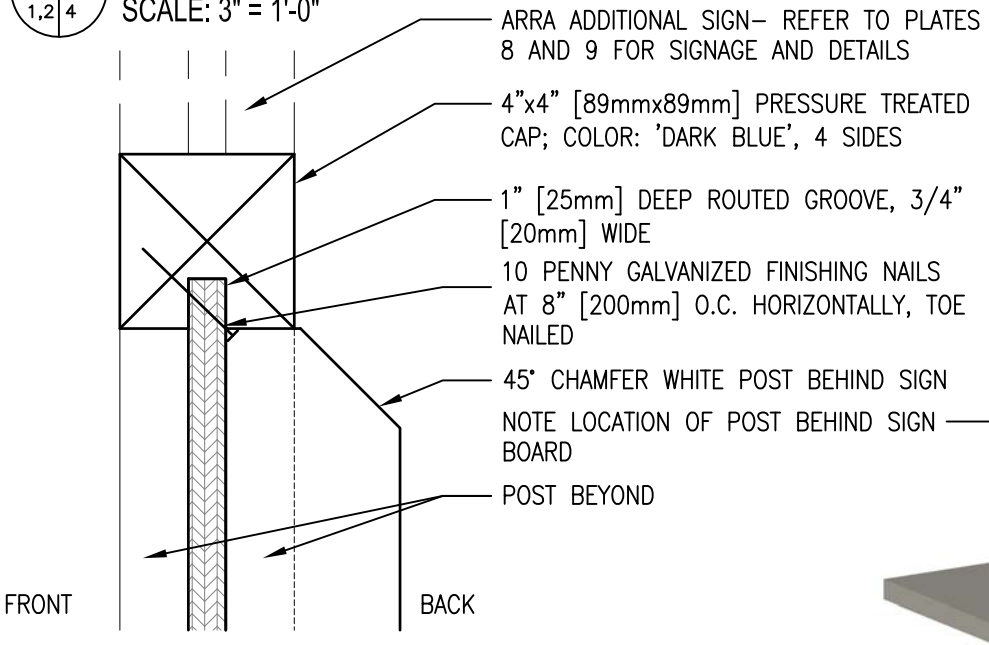
PLATE 3



1 PLAN SECTION

1,2 | 4

SCALE: 3" = 1'-0"



2 SECTION AT TOP

1,2 | 4

SCALE: 3" = 1'-0"

3 ISO VIEW

2 | 4

SCALE: NONE

PROJECT IDENTIFICATION SIGNBOARD SECTIONS

PLATE 4

SECTION 01 78 00

CLOSEOUT SUBMITTALS
08/11

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E1971	(2005; R 2011) Stewardship for the Cleaning of Commercial and Institutional Buildings

GREEN SEAL (GS)

GS-37	(2012) Cleaning Products for Industrial and Institutional Use

U.S. DEPARTMENT OF DEFENSE (DOD)

FC 1-300-09N	(2014) Navy and Marine Corps Design Procedures

1.2 DEFINITIONS

1.2.1 As-Built Drawings

As-built drawings are developed and maintained by the Contractor and depict actual conditions, including deviations from the Contract Documents. These deviations and additions may result from coordination required by, but not limited to: contract modifications; official responses to Contractor submitted Requests for Information; direction from the Contracting Officer; designs which are the responsibility of the Contractor, and differing site conditions. Maintain the as-builts throughout construction as red-lined hard copies on site. As-built drawings are further defined in NFAS 5252.236-9310. These files serve as the basis for the creation of the record drawings.

1.2.2 Record Drawings

The record drawings are the final compilation of actual conditions reflected in the as-built drawings.

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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Warranty Management Plan
Warranty Tags
Final Cleaning
Spare Parts Data

SD-08 Manufacturer's Instructions

Preventative Maintenance
Condition Monitoring (Predictive Testing)
Inspection
Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

SD-11 Closeout Submittals

As-Built Drawings; G

Certification of EPA Designated Items; G

1.4 SPARE PARTS DATA

Submit two copies of the Spare Parts Data list.

a. Indicate manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair. List those items that may be standard to the normal maintenance of the system.

1.5 WARRANTY MANAGEMENT

1.5.1 Warranty Management Plan

Develop a warranty management plan. At least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan. 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. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

c. 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.

d. 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, including the starting date of 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.

e. The plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.

f. Procedure and status of tagging of all equipment covered by extended warranties.

g. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.5.2 Performance Bond

The 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 to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.5.3 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.

1.5.4 Warranty Tags

At the time of installation, tag each warranted item with a durable, oil and water resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also, submit two record copies of the warranty tags showing the layout and design. 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.

Type of product/material	
Model number	
Serial number	
Contract number	
Warranty period from/to	
Inspector's signature	
Construction Contractor	
Address	
Telephone number	

Warranty contact	
Address	
Telephone number	
Warranty response time priority code	
WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.	

PART 2 PRODUCTS

2.1 CERTIFICATION OF EPA DESIGNATED ITEMS

Submit the Certification of EPA Designated Items as required by FAR 52.223-9, "Certification and Estimate of Percentage of Recovered Material Content for EPA Designated Items". Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. "I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials:

1) The product does not meet appropriate performance standards;
2) The product is not available within a reasonable time frame;
3) The product is not available competitively (from two or more sources);
4) The product is only available at an unreasonable price (compared with a comparable non-recycled content product)."

Record each product used in the project that has a requirement or option of containing recycled content in accordance with SECTION 01 33 29 SUSTAINABILITY REPORTING, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, exemptions (1, 2, 3, or 4, as indicated), and comments. Recycled content values may be determined by weight or volume percent, but must be consistent throughout.

PART 3 EXECUTION

3.1 AS-BUILT DRAWINGS

Provide and maintain As-Built Drawings in accordance with NFAS 5252.236-9310. Submit As-Built Drawings 30 days prior to Beneficial Occupancy Date(BOD).

3.1.1 Markup Guidelines

Make comments and markup the drawings complete without reference to letters, memos, or materials that are not part of the As-Built drawing. Show what was changed, how it was changed, where items(s) were relocated

and change related details. These working as-built markup prints must be neat, legible and accurate as follows:

a. Use base colors of red, green, and blue. Color code for changes as follows:

(1) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes.

(2) Deletions (Red) - Over-strike deleted graphic items (lines), lettering in notes and leaders.

(3) Additions (Green) - Added items, lettering in notes and leaders.

b. Provide a legend if colors other than the "base" colors of red, green, and blue are used.

c. Add and denote any additional equipment or material facilities, service lines, incorporated under As-Built Revisions if not already shown in legend.

d. Use frequent written explanations on markup drawings to describe changes. Do not totally rely on graphic means to convey the revision.

e. Use legible lettering and precise and clear digital values when marking prints. Clarify ambiguities concerning the nature and application of change involved.

f. Wherever a revision is made, also make changes to related section views, details, legend, profiles, plans and elevation views, schedules, notes and call out designations, and mark accordingly to avoid conflicting data on all other sheets.

g. For deletions, cross out all features, data and captions that relate to that revision.

h. For changes on small-scale drawings and in restricted areas, provide large-scale inserts, with leaders to the applicable location.

i. Indicate one of the following when attaching a print or sketch to a markup print:

1) Add an entire drawing to contract drawings

2) Change the contract drawing to show

3) Provided for reference only to further detail the initial design.

j. Incorporate all shop and fabrication drawings into the markup drawings.

3.1.2 As-Built Drawings Content

Show on the as-built drawings, but not limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently

fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.

b. The location and dimensions of any changes within the building structure.

c. Layout and schematic drawings of electrical circuits and piping.

d. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

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 shop drawings, 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 Revisions which result from the final inspection.

h. Where contract drawings or specifications present options, show only the option selected for construction on the working as-built markup drawings.

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. Changes in location of equipment and architectural features.

j. Modifications (include within change order price the cost to change working as-built markup drawings to reflect modifications) and compliance with FC 1-300-09N procedures.

l. Actual location of anchors, construction and control joints, etc., in concrete.

m. Unusual or uncharted obstructions that are encountered in the contract work area during construction.

n. Location, extent, thickness, and size of stone protection particularly where it will be normally submerged by water.

3.2 OPERATION AND MAINTENANCE MANUALS

Provide project operation and maintenance manuals as specified in Section 01 78 23 OPERATION AND MAINTENANCE MANUALS.

Submit one PDF file and 3 hard 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 BOD.

3.2.1 Configuration

Operation and Maintenance Manuals must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Provide manufacturer's PDF files of above and bind information in manual format and grouped by technical sections. Organize data by separate index and tabbed sheets for vendor data and manuals. Test data must be legible and of good quality. Caution and warning indications must be clearly labeled. Hard copy pages must have 0.39-inch holes and be bound in 3-ring, loose-leaf binders. Binder must lie flat with printed sheets that are easy to read.

3.2.2 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.

3.3 CLEANUP

Provide final cleaning in accordance with ASTM E1971 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.

3.4 PREVENTATIVE MAINTENANCE

Submit Preventative Maintenance, Condition Monitoring (Predictive Testing) and Inspection schedules with instructions that state when systems should be retested.

a. Define the anticipated length of each test, test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a signoff blank for the Contractor and 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.

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

-- End of Section --

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA
08/15

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E1971	(2005; R 2011) Stewardship for the Cleaning of Commercial and Institutional Buildings

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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-10 Operation and Maintenance Data

Training Plan ; G

Training Outline ; G

Training Content ; G

SD-11 Closeout Submittals

Training Video Recording ; G

Validation of Training Completion ; G

1.3 OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data for the provided equipment, product, or system, defining the importance of system interactions, troubleshooting, and long-term preventive operation and maintenance. Compile, prepare, and aggregate O&M data to include clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.3.1 Package Quality

Documents must be fully legible. Operation and Maintenance data must be consistent with the manufacturer's standard brochures, schematics, printed

instructions, general operating procedures, and safety precautions.

1.3.2 Package Content

Provide data package content in accordance with paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES. Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Use Data Package 3 for commissioned items without a specified data package requirement in the individual technical sections. Provide a Data Package 3 instead of Data Package 1 or 2, as specified in the individual technical section, for items that are commissioned.

1.3.3 Changes to Submittals

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

1.4 OPERATION AND MAINTENANCE MANUAL FILE FORMAT

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

1.4.1 Organization

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

1.4.2 CD or DVD Label and Disk Holder or Case

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

a. Building Number

b. Project Title

c. Activity and Location

d. Construction Contract Number

e. Prepared For: (Contracting Agency)

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

g. Include the disk content on the disk label

h. Date

i. Virus scanning program used

1.5 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

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

1.5.1 Operating Instructions

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

1.5.1.1 Safety Precautions and Hazards

List personnel hazards and equipment or product safety precautions for operating conditions. List all residual hazards identified in the Activity Hazard Analysis provided under Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS. Provide recommended safeguards for each identified hazard.

1.5.1.2 Operator Prestart

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

1.5.1.3 Startup, Shutdown, and Post-Shutdown Procedures

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

1.5.1.4 Normal Operations

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

1.5.1.5 Emergency Operations

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

1.5.1.6 Operator Service Requirements

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

1.5.1.7 Environmental Conditions

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

1.5.1.8 Operating Log

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

1.5.1.9 Additional Requirements for HVAC Control Systems

Provide Data Package 5 and the following for control systems:

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

b. Full as-built sequence of operations.

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

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

(1) Floor

(2) Room number

(3) Room name

(4) Air handler unit ID

(5) Reference drawing number

(6) Air terminal unit tag ID

(7) Heating or cooling valve tag ID

(8) Minimum cfm

(9) Maximum cfm

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

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

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

1.5.2 Preventive Maintenance

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

1.5.2.1 Lubrication Data

Include the following preventive maintenance lubrication data, in addition

to instructions for lubrication required under paragraph OPERATOR SERVICE REQUIREMENTS:

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

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

c. A Lubrication Schedule showing service interval frequency.

1.5.2.2 Preventive Maintenance Plan, Schedule, and Procedures

Provide manufacturer's schedule for routine preventive maintenance, inspections, condition monitoring (predictive tests) and adjustments required to ensure proper and economical operation and to minimize repairs. Provide instructions stating when the systems should be retested. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

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

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

1.5.2.3 Cleaning Recommendations

Provide environmentally preferable cleaning recommendations in accordance with ASTM E1971.

1.5.3 Repair

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

1.5.3.1 Troubleshooting Guides and Diagnostic Techniques

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

1.5.3.2 Wiring Diagrams and Control Diagrams

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

1.5.3.3 Repair Procedures

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

1.5.3.4 Removal and Replacement Instructions

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

1.5.3.5 Spare Parts and Supply Lists

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

1.5.3.6 Repair Work-Hours

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

1.5.4 Appendices

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

1.5.4.1 Product Submittal Data

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

1.5.4.2 Manufacturer's Instructions

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

1.5.4.3 O&M Submittal Data

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

1.5.4.4 Parts Identification

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

1.5.4.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary componentsof the system. Provide copies of warranties required by Section 01 78 00 CLOSEOUT SUBMITTALS.

1.5.4.6 Extended Warranty Information

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

1.5.4.7 Personnel Training Requirements

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

1.5.4.8 Testing Equipment and Special Tool Information

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

1.5.4.9 Testing and Performance Data

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

1.5.4.10 Field Test Reports

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

1.5.4.11 Contractor Information

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

1.6 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

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

1.6.1 Data Package 1

a. Safety precautions and hazards

b. Cleaning recommendations

c. Maintenance and repair procedures

d. Warranty information

e. Extended warranty information

f. Contractor information

g. Spare parts and supply list

1.6.2 Data Package 2

a. Safety precautions and hazards

b. Normal operations

c. Environmental conditions

d. Lubrication data

e. Preventive maintenance plan, schedule, and procedures

f. Cleaning recommendations

g. Maintenance and repair procedures

h. Removal and replacement instructions

i. Spare parts and supply list

j. Parts identification

k. Warranty information

l. Extended warranty information

m. Contractor information

1.6.3 Data Package 3

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Environmental conditions

g. Operating log

h. Lubrication data

i. Preventive maintenance plan, schedule, and procedures

j. Cleaning recommendations

k. Troubleshooting guides and diagnostic techniques

l. Wiring diagrams and control diagrams

m. Maintenance and repair procedures

n. Removal and replacement instructions

o. Spare parts and supply list

p. Product submittal data

q. O&M submittal data

r. Parts identification

s. Warranty information

t. Extended warranty information

u. Testing equipment and special tool information

v. Testing and performance data

w. Contractor information

x. Field test reports

1.6.4 Data Package 4

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Operating log

i. Lubrication data

j. Preventive maintenance plan, schedule, and procedures

k. Cleaning recommendations

l. Troubleshooting guides and diagnostic techniques

m. Wiring diagrams and control diagrams

n. Repair procedures

o. Removal and replacement instructions

p. Spare parts and supply list

q. Repair work-hours

r. Product submittal data

s. O&M submittal data

t. Parts identification

u. Warranty information

v. Extended warranty information

w. Personnel training requirements

x. Testing equipment and special tool information

y. Testing and performance data

z. Contractor information

aa. Field test reports

1.6.5 Data Package 5

a. Safety precautions and hazards

b. Operator prestart

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

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan, schedule, and procedures

g. Troubleshooting guides and diagnostic techniques

h. Wiring and control diagrams

i. Maintenance and repair procedures

j. Removal and replacement instructions

k. Spare parts and supply list

l. Product submittal data

m. Manufacturer's instructions

n. O&M submittal data

o. Parts identification

p. Testing equipment and special tool information

q. Warranty information

r. Extended warranty information

s. Testing and performance data

t. Contractor information

u. Field test reports

v. Additional requirements for HVAC control systems

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 TRAINING

Prior to acceptance of the facility by the Contracting Officer for Beneficial Occupancy, provide comprehensive training for the systems and equipment specified in the technical specifications. The training must be targeted for the building maintenance personnel, and applicable building occupants. Instructors must be well-versed in the particular systems that they are presenting. Address aspects of the eOMSI Manual, as submitted in Section 01 78 24.00 20 FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI). Training must include classroom or field lectures based on the system operating requirements. The location of classroom training requires approval by the Contracting Officer.

3.1.1 Training Plan

Submit a written training plan to the Contracting Officer for approval at least 60 calendar days prior to the scheduled training. Training plan must be approved by the Quality Control Manager (QC) prior to forwarding to the Contracting Officer. Also, coordinate the training schedule with the

Contracting Officer and QC. Include within the plan the following elements:

a. Equipment included in training

b. Intended audience

c. Location of training

d. Dates of training

e. Objectives

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

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

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

i. Instructor names and instructor qualifications for each subject

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

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

3.1.2 Training Content

The core of this training must be based on manufacturer's recommendations and the operation and maintenance information. The QC is responsible for overseeing and approving the content and adequacy of the training. Provide a brief summary of the FACILITY INFORMATION manual, and a more detailed presentation of the PRODUCT AND DRAWING MANUAL, specified in Section 01 78 24.00 20 FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI). Spend 95 percent of the instruction time during the presentation on the OPERATION AND MAINTENANCE DATA. Include the following for each system training presentation:

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

b. Relevant health and safety issues.

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

d. Design intent.

e. Use of O&M Manual Files.

f. Review of control drawings and schematics.

g. Interactions with other systems.

h. Special maintenance and replacement sources.

i. Tenant interaction issues.

3.1.3 Training Outline

Provide the eOMSI Manual files as specified in Section 01 78 24.00 20, FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI), and a written course outline listing the major and minor topics to be discussed by the instructor on each day of the course to each trainee in the course. Provide the course outline 14 calendar days prior to the training.

3.1.4 Training Video Recording

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

3.1.5 Unresolved Questions from Attendees

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

3.1.6 Validation of Training Completion

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

3.1.7 Quality Control Coordination

Coordinate this training with the QC in accordance with Section 01 45 00.00 20 QUALITY CONTROL.

-- End of Section --

SECTION 01 78 24.00 20

FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI)
02/15

PART 1 GENERAL

1.1 REFERENCES

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

U.S. DEPARTMENT OF DEFENSE (DOD)

FC 1-300-09N (2014) Navy and Marine Corps Design Procedures

1.2 DEFINITIONS AND ABBREVIATIONS

1.2.1 eOMSI Manual

Manual (PDF file) provided by the Contractor that includes, but is not limited to, product information, a facility description with photos, and a list of primary facility systems.

1.2.2 Systems

The words "system", "systems", and "equipment", when used in this document refer to as-built systems and equipment.

1.2.3 Computer Assisted Design and Drafting (CADD)

Electronic Computer Assisted Design and Drafting graphic software program that is used to create facility design contract documents and Record Drawings.

1.2.4 KTR

An abbreviation for "Contractor."

1.3 EOMSI MEETINGS

1.3.1 Pre-Construction Meeting

Be prepared to discuss the following during this meeting:

a. eOMSI Manual Development Meetings

b. Processes and methods of gathering eOMSI Manual information during construction.

c. The eOMSI Submittals schedule. Include the eOMSI submittal schedule on the Baseline Construction Schedule in accordance with Section 01 32 17.00 20 COST-LOADED NETWORK ANALYSIS SCHEDULE (NAS).

1.3.2 eOMSI Manual Coordination Meeting

Facilitate a meeting after the Pre-Construction Meeting prior to the submission of the eOMSI Progress Submittal. Meeting attendance must include the Contractor's eOMSI Manual Preparer, and Quality Control Manager, and the Government's Design Manager (DM), Contracting Officer's Representative, and NAVFAC Public Works (PW) Facilities Management Division (FMD). Include any Mechanical, Electrical, and Fire Protection Sub-Contractors.

The purpose of this meeting is to reach a mutual understanding of the scope of work concerning the contract requirements for eOMSI and coordinate the efforts necessary by both the Government and Contractor to ensure an accurate collection, preparation and timely Government review of eOMSI.

1.3.3 Facility Turnover Meeting

Include eOMSI in NAVFAC Red Zone (NRZ) facility turnover meetings as specified in Section 01 30 00, ADMINISTRATIVE REQUIREMENTS.

1.4 SUBMITTAL SCHEDULING

1.4.1 eOMSI, Progress Submittal

Submit the Progress submittal when construction is approximately 50 percent complete, to the Contracting Officer for approval. Provide eOMSI Manual Files (Bookmarked PDF). Include the elements and portions of system construction completed up to this point.

The purpose of this submittal is to verify progress is in accordance with contract requirements as discussed during the eOMSI Coordination Meeting. Field verify a portion of the eOMSI information in accordance with paragraph FIELD VERIFICATION.

1.4.2 eOMSI, Prefinal Submittal

Submit the 100 percent submittal of the eOMSI Prefinal Submittal to the Contracting Officer for approval within 90 calendar days of the Beneficial Occupancy Date (BOD). This submittal must provide a complete, working document that can be used to operate and maintain the facility. Any portion of the submittal that is incomplete or inaccurate requires the entire submittal to be returned for correction. Any discrepancies discovered during the Government's review of eOMSI Progress submittal must be corrected prior to the Prefinal submission.

The eOMSI Prefinal Submittal must include eOMSI Manual Files (Bookmarked PDF).

1.4.3 eOMSI, Final Submittal

Submit completed eOMSI Manual Files (Bookmarked PDF). The Final submittal is due at BOD. Any discrepancies discovered during the Government's review of the Prefinal eOMSI submittal, including the Field Verification, must be corrected prior to the Final eOMSI submission.

1.5 UNITS OF MEASURE

Provide eOMSI utilizing the units of measure used in the Government generated contract documents.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

eOMSI, Progress Submittal; G

eOMSI, Prefinal Submittal; G

eOMSI, Final Submittal; G

PART 2 PRODUCTS

2.1 eOMSI FILES FORMAT

Format eOMSI manuals and files in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA. Include a complete electronically linked operation and maintenance directory. Provide four electronic copies of the eOMSI Manuals to the Contracting Officer for approval.

Scan eOMSI Manual Files for viruses, malware, and spyware using a commercially available scanning program that is routinely updated to identify and remove current virus threats.

2.1.1 eOMSI Manual Organization

Organize the eOMSI Manuals into two parts: 1) Product and Drawing Information, and 2) Facility Information. Bookmark the PDF files for easy access to the information.

a. Bookmark Product and Drawing Information documents in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

b. Bookmark Facility Information to at least one level lower than the major system.

2.1.2 eOMSI Manual CD or DVD Disk Label and Disk Holder or Case

Provide disks in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

2.2 eOMSI MANUAL

2.2.1 Product and Drawing Information

Provide an organized record of the facility products, materials, equipment, and minimum information necessary to operate the facility. Provide Product and Drawing Information for the systems in the final constructed facility.

2.2.1.1 O&M Data

As a minimum, provide the approved O&M Data, submitted in the technical

specification sections, in accordance with paragraph TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES in Section 01 78 23 OPERATION AND MAINTENANCE DATA.

2.2.1.2 Record Drawings

Provide an electronic, PDF copy of the Record Drawings, prepared in accordance with FC 1-300-09N and 01 78 00 CLOSEOUT SUBMITTALS. Bookmark drawings using the sheet title and sheet number.

Include Record Drawings as part of the Red-Zone specified in Section 01 30 00 ADMINISTRATIVE REQUIREMENTS.

2.2.1.3 Utility Record Drawings

Using Record Source Drawings, show and document details of the actual installation of the utility systems; annotate and highlight the eOMSI information. Provide Utility Record Drawings in PDF format. Provide the following drawings at a large enough scale to differentiate designated isolation units from surrounding valves and switches.

a. Utility Schematic Diagrams - Provide a one line schematic diagram for each utility system such as power, water, wastewater, and gas/fuel. Schematic diagram must show from the point where the utility line is connected to the mainline up to the five-foot connection point to the facility. Indicate location or area designation for route of transmission or distribution lines; locations of duct banks, manholes/ handholes or poles; isolation units such as valves and switches; and utility facilities such as pump stations, lift stations, and substations.

b. Enlarged Connection and Cutoff Plans - Provide enlarged floor plans that provide information between the five foot utility connection point and where utilities connect to facility distribution. Enlarge floor plans/ elevations of the rooms where the utility enters the building and indicate on these plans locations of the main interior and exterior connection and cutoff points for the utilities. Also enlarge floor plans / elevations of the rooms where equipment is located. Include enough information to enable someone unfamiliar with the facility to locate the connection and cutoff points. Indicate designations such as room number, panel number, circuit breaker, or valve number, of each utility and equipment connection and cutoff point, and what that connection and cutoff point controls.

2.2.2 Facility Information

Provide the following in Facility Information:

2.2.2.1 General Facility and System Description

Describe the function of the facility. Detail the overall dimensions of the facility, number of floors, foundation type, expected number of occupants, and facility Category Code. List and generally describe all the facility systems and any special building features (for example, HVAC Controls, Sprinkler Systems, Cranes, Elevators, and Generators). Include photographs marked up and labeled to show key operating components and the overall facility appearance.

2.2.2.2 Floor Plans

Provide uncluttered, legible 11 by 17 inches floor plans. Include room numbers, type or function of spaces, and overall facility dimensions on the floor plans. Do not include items such as construction instructions, references, or frame numbers.

2.2.2.3 Floor Coverings, Wall Surfaces, and Ceiling Surfaces

Provide a table that lists by room number (including hallways and common spaces), the type, and area of finish, manufacturer's product name, identifying number, and color. Include a facility summary of the total area for each type of space and floor, wall, or ceiling finish in the table.

2.2.2.4 Windows

Provide a table that lists by room number (including hallways and common spaces), the type of window, window size, number of each size and type, special features, manufacturer's product name, identifying number, and color. The table must include a facility summary of the total number for each type and size of window.

2.2.2.5 Roofing

Provide the total area of each type of roof surface and system. Provide the name of the roofing product and system; manufacturer's, supplier's, and installer's names, addresses, and phone numbers; manufacturer's product name, identifying number, and color. For each type of roof, provide a recommended inspection, maintenance and repair schedule that details checkpoints, frequencies, and prohibited practices. List roof structural load limits.

2.2.2.6 HVAC Filters

Provide a table that lists the quantity, type, size, and location of each HVAC filter, manufacturer's product name, and identifying number.

2.2.2.7 Plumbing Fixtures

Provide a table that lists by room number, the number and type of plumbing and bathroom plumbing fixtures (for example, sinks, water closets, urinals, showers and drinking fountains).

2.2.2.8 Lighting Fixtures

Provide a table that lists by room number (including hallways and common spaces), the type of lighting fixture, ballast, number of lighting fixtures, type of lamps and number of lamps, and the manufacturer's product name and the identifying number. The table must include a facility summary of the total number of fixtures of each type and number of lamps of each type.

2.2.2.9 Equipment Listing

Provide a table that lists the major equipment shown on the design equipment schedules. Show the item descriptions, locations, model numbers; and the names, addresses, and telephone numbers of the manufacturers, suppliers, contractors, and subcontractors.

2.2.2.10 System Flow Diagrams

Provide a flow diagram indicating system liquid, air or gas flow during normal operations. Integrate the system components into the diagram. A compilation of non-integrated, flow diagrams for the individual system components are not acceptable.

2.2.2.11 Valve List

Provide a list of all valves associated with the system. Show valve type, identification number, function, location and normal operating position.

2.2.2.12 Riser Diagrams

Provide riser diagrams and settings of equipment.

PART 3 EXECUTION

3.1 eOMSI TRAINING

Provide training on eOMSI Manuals in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

-- End of Section --

SECTION 02 41 00

DEMOLITION AND DECONSTRUCTION
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.

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

AHRI Guideline K	(2009) Guideline for Containers for Recovered Non-Flammable Fluorocarbon Refrigerants

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.6	(2006) Safety Requirements for Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. DEFENSE LOGISTICS AGENCY (DLA)

DLA 4145.25	(Jun 2000; Reaffirmed Oct 2010) Storage and Handling of Liquefied and Gaseous Compressed Gases and Their Full and Empty Cylinders http://www.aviation.dla.mil/UserWeb/aviationengineering/

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 4000.25-1-M	(2006) MILSTRIP - Military Standard Requisitioning and Issue Procedures
MIL-STD-129	(2014; Rev R) Military Marking for Shipment and Storage

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(2007; Rev K) Obstruction Marking and Lighting

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

40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 82	Protection of Stratospheric Ozone

49 CFR 173.301	Shipment of Compressed Gases in Cylinders and Spherical Pressure Vessels

1.2 PROJECT DESCRIPTION

1.2.1 Demolition Plan

Prepare a Demolition Plan and submit proposed salvage, demolition, and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, airfield lighting, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Identify components and materials to be salvaged for reuse or recycling with reference to paragraph Existing Facilities to be Removed. Append tracking forms for all removed materials indicating type, quantities, condition, destination, and end use. Coordinate with Waste Management Plan. Include statements affirming Contractor inspection of the existing roof deck and its suitability to perform as a safe working platform or if inspection reveals a safety hazard to workers, state provisions for securing the safety of the workers throughout the performance of the work. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan shall be approved by Contracting Officer prior to work beginning.

1.2.2 General Requirements

Do not begin demolition or deconstruction until authorization is received from the Contracting Officer. The work of this section is to be performed in a manner that maximizes the value derived from the salvage and recycling of materials. Remove rubbish and debris from the project site; do not allow accumulations on airfield pavements. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

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

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

1.3.2 Weather Protection

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

1.3.3 Trees

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

1.3.4 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to start of work, the Government will disconnect and seal utilities serving each area of alteration or removal upon written request from the Contractor.

1.3.5 Facilities

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

1.4 BURNING

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

1.5 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available in accordance with the Contract Phasing Plans.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Demolition Plan; G
Existing Conditions

SD-07 Certificates

Notification; G

SD-11 Closeout Submittals

Receipts

1.7 QUALITY ASSURANCE

Submit timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the Regional Office of the United States Environmental Protection Agency (USEPA) and the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

1.7.1 Dust and Debris Control

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

1.8 PROTECTION

1.8.1 Traffic Control Signs

a. Where aircraft safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind, jet or prop blast. Notify the Contracting Officer prior to beginning such work.

Provide a minimum of 2 FAA type L-810 steady burning red obstruction lights on temporary structures (including cranes) over 100 feet, but less than 100 ft, above ground level. The use of LED based obstruction lights are not permitted. For temporary structures (including cranes) over 200 ft above ground level provide obstruction lighting in accordance with FAA AC 70/7460-1. Light construction and installation shall comply with FAA AC 70/7460-1. Lights shall be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer. Maintain the temporary services during the period of construction and remove only after permanent services have been installed and tested and are in operation.

1.8.2 Protection of Personnel

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

1.9 FOREIGN OBJECT DAMAGE (FOD)

Aircraft and aircraft engines are subject to FOD from debris and waste material lying on airfield pavements. Remove all such materials that may appear on operational aircraft pavements due to the Contractor's operations. If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. The barricade shall include a fence covered with a fabric designed to stop the spread of debris. Anchor the fence and fabric to prevent displacement by winds or jet/prop blasts. Remove barricade when no longer required.

1.10 RELOCATIONS

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

1.11 EXISTING CONDITIONS

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

PART 2 PRODUCTS

2.1 FILL MATERIAL

a. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition or deconstruction of structures. Fill material shall be waste products from demolition or deconstruction until all waste appropriate for this purpose is consumed.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Materials shall be designated for reuse onsite whenever possible.

3.1.1 Structures

a. Remove existing structures indicated to be removed to 2.5 feet below grade. Remove sidewalks, curbs, gutters and street light bases as indicated.

b. Demolish structures in a systematic manner from the top of the structure to the ground. Complete demolition work above each tier or floor before the supporting members on the lower level are disturbed. Demolish concrete and masonry walls in small sections. Remove structural framing members and lower to ground by means of derricks, platforms hoists, or other suitable methods as approved by the Contracting Officer.

c. Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

d.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. Where existing buildings are shown to be demolished, unless shown otherwise, remove utilities serving buildings complete to 5 feet from the outside face of building or to the nearest structure if within 50 feet of building.When utility lines are encountered but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area. Remove meters and related equipment and deliver to a location on the station in accordance with instructions of the Contracting Officer.

3.1.3 Chain Link Fencing

Remove chain link fencing, gates and other related salvaged items scheduled

for removal and transport to designated areas. Remove gates as whole units. Cut chain link fabric to 25 foot lengths and store in rolls off the ground.

3.1.4 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated complete. Provide neat sawcuts at limits of pavement removal as indicated. Pavement and slabs designated to be recycled and utilized in this project shall be moved, ground and stored as directed by the Contracting Officer. Pavement and slabs not to be used in this project shall be removed from the Installation at Contractor's expense.

3.1.5 Masonry

Sawcut and remove masonry so as to prevent damage to surfaces to remain . Where new masonry adjoins existing, the new work shall abut or tie into the existing construction as indicated . Provide square, straight edges and corners where existing masonry adjoins new work and other locations. Masonry removed in pieces shall be crushed for use as aggregate.

3.1.6 Concrete

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

3.1.7 Structural Steel

Dismantle structural steel at field connections and in a manner that will prevent bending or damage. Salvage for recycle structural steel, steel joists, girders, angles, plates, columns and shapes. Flame-cutting torches are permitted when other methods of dismantling are not practical. Transport steel joists and girders as whole units and not dismantled. Transport structural steel shapes to a designated recycling facility , stacked according to size, type of member and length, and stored off the ground, protected from the weather.

3.1.8 Miscellaneous Metal

Salvage shop-fabricated items such as access doors and frames, steel gratings, metal ladders, wire mesh partitions, metal railings, metal windows and similar items as whole units. Salvage light-gage and cold-formed metal framing, such as steel studs, steel trusses, metal gutters, roofing and siding, metal toilet partitions, toilet accessories and similar items. Scrap metal shall become the Contractor's property. Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility, in accordance with the Waste Management Plan.

3.1.9 Carpentry

Salvage for recycle lumber, millwork items, and finished boards, and sort by type and size. Remove windows, doors, frames, and cabinets, and similar items as whole units, complete with trim and accessories. Do not remove

hardware attached to units, except for door closers. Brace the open end of door frames to prevent damage.

3.1.10 Airfield Lighting

Remove existing airfield lighting as indicated and terminate in a manner satisfactory to the Contracting Officer. Remove edge lights and associated transformers as indicated and deliver to a location on the station in accordance with instructions of the Contracting Officer.

3.1.11 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

a. Concrete and Masonry: Completely fill holes and depressions, left as a result of removals in existing masonry walls to remain, with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.

3.1.12 Electrical Equipment and Fixtures

Salvage motors, motor controllers, and operating and control equipment that are attached to the driven equipment. Salvage wiring systems and components. Box loose items and tag for identification. Disconnect primary, secondary, control, communication, and signal circuits at the point of attachment to their distribution system.

3.1.12.1 Fixtures

Remove and salvage electrical fixtures. Salvage unprotected glassware from the fixture and salvage separately. Salvage incandescent, mercury-vapor, and fluorescent lamps and fluorescent ballasts manufactured prior to 1978, boxed and tagged for identification, and protected from breakage.

3.1.12.2 Electrical Devices

Remove and salvage switches, switchgear, transformers, conductors including wire and nonmetallic sheathed and flexible armored cable, regulators, meters, instruments, plates, circuit breakers, panelboards, outlet boxes, and similar items. Box and tag these items for identification according to type and size.

3.1.12.3 Wiring Ducts or Troughs

Remove and salvage wiring ducts or troughs. Dismantle plug-in ducts and wiring troughs into unit lengths. Remove plug-in or disconnecting devices from the busway and store separately.

3.1.12.4 Conduit and Miscellaneous Items

Salvage conduit except where embedded in concrete or masonry. Consider

corroded, bent, or damaged conduit as scrap metal. Sort straight and undamaged lengths of conduit according to size and type. Classify supports, knobs, tubes, cleats, and straps as debris to be removed and disposed.

3.1.13 Elevators and Hoists

Remove elevators, hoists, and similar conveying equipment and salvage as whole units, to the most practical extent. Remove and prepare items for salvage without damage to any of the various parts. Salvage and store rails for structural steel with the equipment as an integral part of the unit.

3.1.14 Items With Unique/Regulated Disposal Requirements

Remove and dispose of items with unique or regulated disposal requirements in the manner dictated by law or in the most environmentally responsible manner.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

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

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

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

3.3.2 Reuse of Materials and Equipment

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

3.3.3 Salvaged Materials and Equipment

Remove materials and equipment that are indicated to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site , as directed within 2 miles of the work site.

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

b. Store all materials salvaged for the Contractor as approved by the Contracting Officer and remove from Government property before

completion of the contract. On site sales of salvaged material is prohibited.

c. Remove salvaged items to remain the property of the Government in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers.

d. Not used.

e. Remove historical items in a manner to prevent damage. Deliver the following historical items to the Government for disposition: Corner stones, contents of corner stones, and document boxes wherever located on the site.

f. Remove and capture all Class I ODS refrigerants in accordance with the Clean Air Act Amendment of 1990, and turn in to the Navy as directed by the Commanding Officer.

3.3.4 Disposal of Ozone Depleting Substance (ODS)

Class I and Class II ODS are defined in Section, 602(a) and (b), of The Clean Air Act. Prevent discharge of Class I and Class II ODS to the atmosphere. Place recovered ODS in cylinders meeting AHRI Guideline K suitable for the type ODS (filled to no more than 80 percent capacity) and provide appropriate labeling. Recovered ODS shall be turned over to the Contracting Officer . Products, equipment and appliances containing ODS in a sealed, self-contained system (e.g. residential refrigerators and window air conditioners) shall be disposed of in accordance with 40 CFR 82. Submit Receipts or bills of lading, as specified. Submit a shipping receipt or bill of lading for all containers of ozone depleting substance (ODS) shipped to the Defense Depot, Richmond, Virginia.

3.3.4.1 Special Instructions

No more than one type of ODS is permitted in each container. A warning/hazardous label shall be applied to the containers in accordance with Department of Transportation regulations. All cylinders including but not limited to fire extinguishers, spheres, or canisters containing an ODS shall have a tag with the following information:

a. Activity name and unit identification code

b. Activity point of contact and phone number

c. Type of ODS and pounds of ODS contained

d. Date of shipment

e. National stock number (for information, call (804) 279-4525).

3.3.4.2 Fire Suppression Containers

Deactivate fire suppression system cylinders and canisters with electrical charges or initiators prior to shipment. Also, safety caps must be used to cover exposed actuation mechanisms and discharge ports on these special cylinders.

3.3.5 Transportation Guidance

Ship all ODS containers in accordance with MIL-STD-129, DLA 4145.25 (also referenced one of the following: Army Regulation 700-68, Naval Supply Instruction 4440.128C, Marine Corps Order 10330.2C, and Air Force Regulation 67-12), 49 CFR 173.301, and DOD 4000.25-1-M.

3.3.6 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable combustible material off the site .

3.4 CLEANUP

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

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified in the Waste Management Plan . Storage of removed materials on the project site is prohibited.

3.5.2 Burning on Government Property

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

3.5.3 Removal to Spoil Areas on Government Property

Transport noncombustible materials removed from demolition and deconstruction structures to designated spoil areas on Government property.

3.5.4 Removal from Government Property

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

3.6 REUSE OF SALVAGED ITEMS

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

-- End of Section --

SECTION 02 82 16.00 20

ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS
08/11

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)

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

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE Z9.2	(2012) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

ASTM INTERNATIONAL (ASTM)

ASTM C732	(2006; R 2012) Aging Effects of Artificial Weathering on Latex Sealants
ASTM D2794	(1993; R 2010) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D522/D522M	(2014) Mandrel Bend Test of Attached Organic Coatings
ASTM E119	(2012a) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E1368	(2014) Visual Inspection of Asbestos Abatement Projects
ASTM E736	(2000; R 2011) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM E84	(2013a) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2013) Standard Test Methods for Water Vapor Transmission of Materials

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)

COMAR 26.11.21	Control of Asbestos

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 560/5-85-024	(1985) Guidance for Controlling Asbestos-Containing Materials in Buildings (Purple Book)

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

29 CFR 1926.103	Respiratory Protection
29 CFR 1926.1101	Asbestos
29 CFR 1926.200	Accident Prevention Signs and Tags
29 CFR 1926.51	Sanitation
29 CFR 1926.59	Hazard Communication
40 CFR 61-SUBPART A	General Provisions
40 CFR 61-SUBPART M	National Emission Standard for Asbestos
40 CFR 763	Asbestos

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

ND OPNAVINST 5100.23	(2005; Rev G) Navy Occupational Safety and Health (NAVOSH) Program Manual

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009) Standard for High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 ACM

Asbestos Containing Materials.

1.2.2 Amended Water

Water containing a wetting agent or surfactant with a maximum surface tension of 0.00042 psi.

1.2.3 Area Sampling

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

1.2.4 Asbestos

The term asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content of the material is determined to be at least one percent.

1.2.5 Asbestos Control Area

That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

1.2.6 Asbestos Fibers

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

1.2.7 Asbestos Permissible Exposure Limit

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

1.2.8 Background

The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

1.2.9 Contractor

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

1.2.10 Competent Person

A person meeting the requirements for competent person as specified in 29 CFR 1926.1101 including a person capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, and is specifically trained in a training course which meet the criteria of EPA's Model Accreditation Plan (40 CFR 763) for project designer or supervisor, or its equivalent. The competent person shall have a currentState of Maryland asbestos contractors or supervisors license.

1.2.11 Encapsulation

The abatement of an asbestos hazard through the appropriate use of chemical encapsulants.

1.2.12 Encapsulants

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

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

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

c. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage)

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

1.2.13 Friable Asbestos Material

One percent asbestos containing material that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

1.2.14 Glovebag Technique

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

1.2.15 HEPA Filter Equipment

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

1.2.16 Navy Consultant (NC)

That qualified person employed directly by the Government to monitor, sample, inspect the work or in some other way advise the Contracting Officer. The NC is normally a private consultant, but can be an employee of the Government.

1.2.17 Negative Pressure Enclosure (NPE)

That engineering control technique described as a negative pressure enclosure in 29 CFR 1926.1101.

1.2.18 Nonfriable Asbestos Material

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

1.2.19 Personal Sampling

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

1.2.20 Private Qualified Person (PQP)

That qualified person hired by the Contractor to perform the herein listed tasks.

1.2.21 Qualified Person (QP)

A Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer; and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The QP must be qualified to perform visual inspections as indicated in ASTM E1368. The QP shall be appropriately licensed in the State of Maryland

1.2.22 TEM

Refers to Transmission Electron Microscopy.

1.2.23 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

1.2.24 Wetting Agent

A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 0.00042 psi.

1.3 REQUIREMENTS

1.3.1 Description of Work

The work covered by this section includes the handling and control of asbestos containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos containing materials generated by the work. More specific operational procedures shall be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. The asbestos work includes the demolition and removal of ACM located within the electrical vaults scoped for demolition/reconstruction which is governed by 40 CFR 763. Provide The Navy will evacuate the building during the asbestos abatement work. All asbestos removal work shall be supervised by a competent person as specified herein.

1.3.2 Medical Requirements

Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

1.3.2.1 Medical Examinations

Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent State or local directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination shall be given on an annual basis

to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."

1.3.2.2 Medical Records

Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of 50 years after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.

1.3.3 Employee Training

Submit certificates, prior to the start of work but after the main abatement submittal, signed by each employee indicating that the employee has received training in the proper handling of materials and wastes that contain asbestos in accordance with 40 CFR 763; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis. Certificates shall be organized by individual worker, not grouped by type of certification. Post appropriate evidence of compliance with the training requirements of 40 CFR 763. Train all personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) training criteria or State training criteria whichever is more stringent. The Contractor shall document the training by providing: dates of training, training entity, course outline, names of instructors, and qualifications of instructors upon request by the Contracting Officer. Furnish each employee with respirator training and fit testing administered by the PQP as required by 29 CFR 1926.1101. Fully cover engineering and other hazard control techniques and procedures. All asbestos workers shall have a current State of Maryland asbestos worker's license.

1.3.4 Permits , Licenses, and Notifications

Obtain necessary permits and licenses in conjunction with asbestos removal, encapsulation, hauling, and disposition, and furnish notification of such actions required by Federal, State, regional, and local authorities prior to the start of work. Notify the State of Maryland MDE Asbestos Division at (410) 537-3809 and the Contracting Officer in writing 20 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M and COMAR 26.11.21 Control of Asbestos. Notify the Contracting Officer and other appropriate Government agencies in writing 20 working days prior to the start of asbestos work as indicated in applicable laws, ordinances, criteria, rules, and regulations. Submit copies of all Notifications to the Contracting Officer.

1.3.5 Environment, Safety and Health Compliance

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of

Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.1101, 40 CFR 61-SUBPART A, 40 CFR 61-SUBPART M, and ND OPNAVINST 5100.23. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement as defined by the Government shall apply.

1.3.6 Respiratory Protection Program

Establish and implement a respirator program as required by AIHA Z88.6, 29 CFR 1926.1101, and 29 CFR 1926.103. Submit a written description of the program to the Contracting Officer. Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

1.3.6.1 Respirator Program Records

Submit records of the respirator program as required by AIHA Z88.6, 29 CFR 1926.103, and 29 CFR 1926.1101.

1.3.7 Asbestos Hazard Control Supervisor

The Contractor shall be represented on site by a supervisor, trained using the model Contractor accreditation plan as indicated in the Federal statutes for all portions of the herein listed work.

1.3.8 Hazard Communication

Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Material Safety Data Sheets (MSDS) for all materials brought to the site.

1.3.9 Asbestos Hazard Abatement Plan

Submit a detailed plan of the safety precautions such as lockout, tagout, tryout, fall protection, and confined space entry procedures and equipment and work procedures to be used in the removal of materials containing asbestos. The plan, not to be combined with other hazard abatement plans, shall be prepared, signed, and sealed by the PQP. Provide a Table of Contents for each abatement submittal, which shall follow the sequence of requirements in the contract. Such plan shall include but not be limited to the precise personal protective equipment to be used including, but not limited to, respiratory protection, type of whole-body protection , the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, planned air monitoring strategies, and a detailed description of the method to be employed in order to control environmental pollution. The plan shall also include (both fire and medical emergency) response plans. The Asbestos Hazard Abatement Plan must be approved in writing prior to starting any asbestos work. The Contractor, Asbestos Hazard Control Supervisor, and PQP shall meet with the Contracting Officer prior to beginning work, to discuss in detail the Asbestos Hazard Abatement Plan, including work procedures and safety

precautions. Once approved by the Contracting Officer, the plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan shall be identified specifically in the plan to allow for free discussion and approval by the Contracting Officer prior to starting work.

1.3.10 Testing Laboratory

Submit the name, address, and telephone number of each testing laboratory selected for the sampling, analysis, and reporting of airborne concentrations of asbestos fibers along with evidence that each laboratory selected holds the appropriate State license and/or permits and certification that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials or transmission electron microscopy is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis. The testing laboratory firm shall be independent of the asbestos contractor and shall have no employee or employer relationship which could constitute a conflict of interest.

1.3.11 Landfill Approval

Submit written evidence that the landfill is for asbestos disposal by the U.S. Environmental Protection Agency, Region 3, Air Enforcement Section (38W12), and local regulatory agencies. Within 3 working days after delivery, submit detailed delivery tickets, prepared, signed, and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill. Submit a copy of the waste shipment records within 1 day of the shipment leaving the project site.

1.3.12 Medical Certification

Provide a written certification for each worker and supervisor, signed by a licensed physician indicating that the worker and supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103 as prescribed by law. Submit certificates prior to the start of work but after the main abatement submittal.

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

SD-03 Product Data

Local exhaust equipment; G

Vacuums; G

Respirators; G

Pressure differential automatic recording instrument; G

Amended water; G

Glovebags; G

Material Safety Data Sheets (MSDS) for all materials proposed for transport to the project site; G

Encapsulants; G

SD-06 Test Reports

Air sampling results; G

Pressure differential recordings for local exhaust system; G

Asbestos disposal quantity report; G

Clearance sampling; G

SD-07 Certificates

Asbestos hazard abatement plan; G

Testing laboratory; G

Private qualified person documentation; G

Contractor's license; G

Competent person documentation; G

Worker's license; G

Landfill approval; G

Employee training; G

Medical certification requirements; G

Waste shipment records and if applicable exemption report; G

Respiratory Protection Program; G

Delivery tickets; G

Vacuums; G

Water filtration equipment; G

Ventilation systems; G

Other equipment used to contain airborne asbestos fibers; G

Chemical encapsulants sealers;; G

Notifications

Show compliance with ASSE Z9.2 by providing manufacturers' certifications.

SD-11 Closeout Submittals

Notifications; G

Rental equipment; G

Respirator program records; G

Permits and licenses; G

Protective clothing decontamination facility notification; G

1.5 QUALITY ASSURANCE

1.5.1 Private Qualified Person Documentation

Submit the name, address, and telephone number of the Private Qualified Person (PQP) selected to prepare the Asbestos Hazard Abatement Plan, direct monitoring and training, and documented evidence that the PQP has successfully completed training in and is accredited and where required is certified as, a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer as described by 40 CFR 763 and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The PQP and the asbestos contractor shall not have an employee/employer relationship or financial relationship which could constitute a conflict of interest. The PQP shall be a first tier subcontractor.

1.5.2 Competent Person Documentation

Submit training certification and a current State of Maryland Asbestos Contractor's and Supervisor's License.

1.5.3 Worker's License

Submit documentation that requires all workers have a current State of Maryland Asbestos Workers License.

1.5.4 Contractor's License

Contractor shall have current Maryland asbestos contractor's license. Submit a copy of the asbestos contractor's license issued by the State of Commonwealth of Virginia.

1.5.5 Air Sampling Results

Complete fiber counting and provide results to the PQP and NC for review within 16 hours of the "time off" of the sample pump. Notify the Contracting Officer immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees where required by law within 3 working days, signed by the testing laboratory employee performing air sampling, the employee that analyzed the sample, and the PQP and NC. Notify the Contractor and the Contracting Officer immediately of

any variance in the pressure differential which could cause adjacent unsealed areas to have asbestos fiber concentrations in excess of 0.01 fibers per cubic centimeter or background whichever is higher. In no circumstance shall levels exceed 0.1 fibers per cubic centimeter.

1.5.6 Pressure Differential Recordings for Local Exhaust System

Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external to the enclosure and operate it continuously, 24 hours a day, until the temporary enclosure of the asbestos control area is removed. Submit pressure differential recordings for each work day to the PQP and NC for review and to the Contracting Officer within 24 hours from the end of each work day.

1.5.7 Protective Clothing Decontamination Quality Control Records

Provide all records that document quality control for the decontamination of reusable outer protective clothing.

1.6 EQUIPMENT

1.6.1 Rental Equipment

Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

PART 2 PRODUCTS

2.1 ENCAPSULANTS

Shall conform to current USEPA requirements, shall contain no toxic or hazardous substances as defined in 29 CFR 1926.59, and shall conform to the following performance requirements.

2.1.1 Removal Encapsulants

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test

Requirement	Test Standard
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.2 Bridging Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.3 Penetrating Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Cohesion/Adhesion Test - 50 pounds of force/foot	ASTM E119
Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test

Requirement	Test Standard
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.4 Lock-down Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Tested with fireproofing over encapsulant applied directly to steel member)	ASTM E119
Bond Strength: 100 pounds of force/foot	ASTM E736
(Tests compatibility with cementitious and fibrous fireproofing)	

PART 3 EXECUTION

3.1 EQUIPMENT

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

3.1.1 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

3.1.1.1 Respirators for Handling Asbestos

Provide personnel engaged in pre-cleaning, cleanup, handling, removal and or demolition of asbestos materials with respiratory protection as indicated

in 29 CFR 1926.1101 and 29 CFR 1926.103.

3.1.2 Exterior Whole Body Protection

3.1.2.1 Outer Protective Clothing

Provide personnel exposed to asbestos with disposable "non-breathable," whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape.

3.1.2.2 Work Clothing

Provide cloth work clothes for wear under the outer protective clothing and foot coverings and either dispose of or properly decontaminate them as recommended by the NC after each use.

3.1.2.3 Personal Decontamination Unit

Provide a temporary, negative pressure unit with a separate decontamination locker room and clean locker room with a shower that complies with 29 CFR 1926.51(f)(4)(ii) through (V) in between for personnel required to wear whole body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. HEPA vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and seal in impermeable bags or containers for disposal. Do not wear work clothing between home and work. Locate showers between the decontamination locker room and the clean locker room and require that all employees shower before changing into street clothes. Collect used shower water and filter with approved water filtration equipment to remove asbestos contamination. Dispose of filters and residue as asbestos waste. Discharge clean water to the sanitary system. Dispose of asbestos contaminated work clothing as asbestos contaminated waste . Decontamination units shall be physically attached to the asbestos control area. Build both a personnel decontamination unit and an equipment decontamination unit onto and integral with each asbestos control area.

3.1.2.4 Eye Protection

Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.

3.1.3 Warning Signs and Labels

Provide warning signs printed in English and at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos.

3.1.3.1 Warning Sign

Provide vertical format conforming to 29 CFR 1926.200, and 29 CFR 1926.1101 minimum 20 by 14 inches displaying the following legend in the lower panel:

Legend	Notation
Danger	one inch Sans Serif Gothic or Block
Asbestos	one inch Sans Serif Gothic or Block
Cancer and Lung Disease Hazard	1/4 inch Sans Serif Gothic or Block
Authorized Personnel Only	1/4 inch Sans Serif Gothic or Block
Respirators and Protective Clothing are Required in this Area	1/4 inch Sans Serif Gothic or Block

Spacing between lines shall be at least equal to the height of the upper of any two lines.

3.1.3.2 Warning Labels

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

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

3.1.4 Local Exhaust System

Provide a local exhaust system in the asbestos control area in accordance with ASSE Z9.2 and 29 CFR 1926.1101 that will provide at least four air changes per hour inside of the negative pressure enclosure. Local exhaust equipment shall be operated 24 hours per day, until the asbestos control area is removed and shall be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the control area of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. In no case shall the building ventilation system be used as the local exhaust system for the asbestos control area. Filters on exhaust equipment shall conform to ASSE Z9.2 and UL 586. The local exhaust system shall terminate out of doors and remote from any public access or ventilation system intakes.

3.1.5 Tools

Vacuums shall be leak proof to the filter and equipped with HEPA filters.

Filters on vacuums shall conform to ASSE Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse.

3.1.6 Rental Equipment

If rental equipment is to be used, furnish written notification to the rental agency concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

3.1.7 Glovebags

Submit written manufacturers proof that glovebags will not break down under expected temperatures and conditions.

3.2 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, and as specified herein. Use wet or if given prior EPA approval, dry removal procedures and techniques. Personnel shall wear and utilize protective clothing and equipment as specified herein. Eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics shall not be permitted in the asbestos work or control areas. Personnel of other trades not engaged in the removal and demolition of asbestos containing material shall not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this specification are complied with by the trade personnel. Seal all roof top penetrations, except plumbing vents, prior to asbestos roofing work. Shut down the building heating, ventilating, and air conditioning system, cap the openings to the system, prior to the commencement of asbestos work. Disconnect electrical service when wet removal is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFCI) protection prior to the use of any water . If an asbestos fiber release or spill occurs outside of the asbestos control area, stop work immediately, correct the condition to the satisfaction of the Contracting Officer including clearance sampling, prior to resumption of work.

3.2.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Contracting Officer using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the Government as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the PQP work may proceed at the discretion of the Contracting Officer.

3.2.2 Precleaning

Wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos prior to establishment of an enclosure.

3.2.3 Asbestos Control Area Requirements

3.2.3.1 Negative Pressure Enclosure

Block and seal openings in areas where the release of airborne asbestos fibers can be expected. Establish an asbestos negative pressure enclosure with the use of curtains, portable partitions, or other enclosures in order to prevent the escape of asbestos fibers from the contaminated asbestos work area. Negative pressure enclosure development shall include protective covering of uncontaminated walls, and ceilings with a continuous membrane of two layers of minimum 6-mil plastic sheet sealed with tape to prevent water or other damage. Provide two layers of 6-mil plastic sheet over floors and extend a minimum of 12 inches up walls. Seal all joints with tape. Provide local exhaust system in the asbestos control area. Openings will be allowed in enclosures of asbestos control areas for personnel and equipment entry and exit, the supply and exhaust of air for the local exhaust system and the removal of properly containerized asbestos containing materials. Replace local exhaust system filters as required to maintain the efficiency of the system.

3.2.4 Removal Procedures

Wet asbestos material with a fine spray of amended water during removal, cutting, or other handling so as to reduce the emission of airborne fibers. Remove material and immediately place in 6 mil plastic disposal bags. Remove asbestos containing material in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. Where unusual circumstances prohibit the use of 6 mil plastic bags, submit an alternate proposal for containment of asbestos fibers to the Contracting Officer for approval. For example, in the case where both piping and insulation are to be removed, the Contractor may elect to wet the insulation, wrap the pipes and insulation in plastic and remove the pipe by sections. Asbestos containing material shall be containerized while wet. At no time shall asbestos material be allowed to accumulate or become dry. Lower and otherwise handle asbestos containing material as indicated in 40 CFR 61-SUBPART M.

3.2.4.1 Sealing Contaminated Items Designated for Disposal

Remove contaminated architectural, mechanical, and electrical appurtenances such as venetian blinds, full-height partitions, carpeting, duct work, pipes and fittings, radiators, light fixtures, conduit, panels, and other contaminated items designated for removal by completely coating the items with an asbestos lock-down encapsulant at the demolition site before removing the items from the asbestos control area. These items need not be vacuumed. The asbestos lock-down encapsulant shall be tinted a contrasting color. It shall be spray-applied by airless method. Thoroughness of sealing operation shall be visually gauged by the extent of colored coating on exposed surfaces. Lock-down encapsulants shall comply with the performance requirements specified herein.

3.2.4.2 Exposed Pipe Insulation Edges

Contain edges of asbestos insulation to remain that are exposed by a removal operation. Wet and cut the rough ends true and square with sharp tools and then encapsulate the edges with a 1/4 inch thick layer of non-asbestos containing insulating cement troweled to a smooth hard finish. When cement is dry, lag the end with a layer of non-asbestos

lagging cloth, overlapping the existing ends by at least 4 inches. When insulating cement and cloth is an impractical method of sealing a raw edge of asbestos, take appropriate steps to seal the raw edges as approved by the Contracting Officer.

3.2.5 Encapsulation Procedures

3.2.5.1 Large-Scale Application

Apply encapsulant using the same equipment and procedures as employed for the test patches. Keep the encapsulant material stirred to prevent settling. Keep a clean work area. Change pre-filters in the ventilation equipment as soon as they appear clogged by encapsulant aerosol or pressure differential drops below 0.02 Hg.

3.2.6 Air Sampling

Sampling of airborne concentrations of asbestos fibers shall be performed in accordance with 29 CFR 1926.1101 and as specified herein. Sampling performed in accordance with 29 CFR 1926.1101 shall be performed by the PQP. Sampling performed for environmental and quality control reasons shall be performed by the PQP . Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the Contractor, the Government will determine which results predominate.

3.2.6.1 Sampling Prior to Asbestos Work

Provide area air sampling and establish the baseline one day prior to the masking and sealing operations for each demolition removal site. Establish the background by performing area sampling in similar but uncontaminated sites in the building.

3.2.6.2 Sampling During Asbestos Work

The PQP shall provide personal and area sampling as indicated in 29 CFR 1926.1101 and governing environmental regulations. In addition, provided the same type of work is being performed, provide area sampling at least once every work shift close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately.

3.2.6.3 Sampling After Final Clean-Up (Clearance Sampling)

Provide area sampling of asbestos fibers using aggressive air sampling techniques as defined in the EPA 560/5-85-024 and establish an airborne asbestos concentration of less than 0.01 fibers per cubic centimeter after final clean-up but before removal of the enclosure or the asbestos work control area. After final cleanup and the asbestos control area is dry but prior to clearance sampling, the PQP and NC shall perform a visual inspection in accordance with ASTM E1368 to ensure that the asbestos control and work area is free of any accumulations of dirt, dust, or debris. Prepare a written report signed and dated by the PQP documenting that the asbestos control area is free of dust, dirt, and debris and all

waste has been removed. The asbestos fiber counts from these samples shall be less than 0.01 fibers per cubic centimeter or be not greater than the background, whichever is greater. Should any of the final samples indicate a higher value, the Contractor shall take appropriate actions to re-clean the area and shall repeat the sampling and analysis at the Contractor's expense.

3.2.7 Lock-Down

Prior to removal of plastic barriers and after pre-clearance clean up of gross contamination, the PQP shall conduct a visual inspection of all areas affected by the removal in accordance with ASTM E1368. Inspect for any visible fibers .

3.2.8 Site Inspection

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

3.3 CLEAN-UP AND DISPOSAL

3.3.1 Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR. When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Contracting Officer will attest that the area is safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order. The Contracting Officer will visually inspect all surfaces within the enclosure for residual material or accumulated dust or debris. The Contractor shall re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The Contracting Officer must agree that the area is safe in writing before unrestricted entry will be permitted. The Government shall have the option to perform monitoring to determine if the areas are safe before entry is permitted.

3.3.2 Title to Materials

All waste materials, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified in applicable local, State, and Federal regulations and herein.

3.3.3 Disposal of Asbestos

3.3.3.1 Procedure for Disposal

Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 6 mils thick, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 6 mils thick bags with the approved warnings and DOT labeling preprinted on the bag. The name of the waste generator and the location at which the waste was generated shall be clearly indicated on the outside of each container. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be assigned by the Contracting Officer or his authorized representative. Procedure for hauling and disposal shall comply with 40 CFR 61-SUBPART M, State, regional, and local standards. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags shall remain in the drum and the entire contaminated drum shall be buried. Uncontaminated drums may be recycled. Workers unloading the sealed drums shall wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.

3.3.3.2 Asbestos Disposal Quantity Report

Direct the PQP to record and report, to the Contracting Officer, the amount of asbestos containing material removed and released for disposal. Deliver the report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in linear feet or square feet as described initially in this specification and in cubic feet for the amount of asbestos containing material released for disposal.

-- End of Section --

SECTION 02 82 33.13 20

REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD
08/11

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)

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

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

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

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

29 CFR 1926.103	Respiratory Protection
29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and

	Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009) Standard for High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 Abatement

As applied to target housing and child occupied facilities, "abatement" means any set of measures designed to permanently eliminate lead-based paint hazards in accordance with standards established by appropriate Federal agencies. Such term includes:

a. The removal of lead-based paint and lead-contaminated dust, the permanent containment or encapsulation of lead-based paint, the replacement of lead-painted surfaces or fixtures, and the removal or covering of lead contaminated soil; and

b. All preparation, cleanup, disposal, and post-abatement clearance testing activities associated with such measures.

1.2.2 Action Level

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

1.2.3 Area Sampling

Sampling of lead concentrations within the lead control area and inside the physical boundaries, which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel.

1.2.4 Competent Person (CP)

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

1.2.5 Contaminated Room

Refers to a room for removal of contaminated personal protective equipment (PPE).

1.2.6 Decontamination Shower Facility

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

1.2.7 Deleading

Activities conducted by a person who offers to eliminate lead-based paint or lead-based paint hazards or to plan such activities in commercial buildings, bridges or other structures.

1.2.8 Eight-Hour Time Weighted Average (TWA)

Airborne concentration of lead to which an employee is exposed, averaged over an 8 hour workday as indicated in 29 CFR 1926.62.

1.2.9 High Efficiency Particulate Air (HEPA) Filter Equipment

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

1.2.10 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps.

1.2.11 Lead-Based Paint (LBP)

Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.

1.2.12 Lead-Based Paint Activities

In the case of target housing or child occupied facilities, lead-based paint activities include; a lead-based paint inspection, a risk assessment, or abatement of lead-based paint hazards.

1.2.13 Lead-Based Paint Hazard (LBP Hazard)

Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

1.2.14 Paint with Lead (PWL)

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

1.2.15 Lead Control Area

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

1.2.16 Lead Permissible Exposure Limit (PEL)

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

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day1.2.17 Personal Sampling

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

1.2.18 Physical Boundary

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

1.2.19 Target Housing

Housing constructed prior to 1978. It does not include housing for the elderly, or persons with disabilities unless any one or more children age 6 years and younger resides or is expected to reside in such housing.

1.3 DESCRIPTION

1.3.1 Description of Work

Demolition of electrical vaults with lead-based paint and paint with lead on walls, floors and doors.1.3.2 Coordination with Other Work

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

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section

01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Vacuum Filters; G

Respirators; G

SD-06 Test Reports

sampling results; G

Occupational and Environmental Assessment Data Report; G

SD-07 Certificates

Qualifications of CP; G

Testing Laboratory qualifications; G

Training Certification of workers and supervisors; G

Third Party Consultant Qualifications; G

lead-based paint/paint with lead removal/control plan including CP approval (signature, date, and certification number); G

Rental equipment notification; G

Respiratory Protection Program; G

Hazard Communication Program; G

EPA or State approved hazardous waste treatment, storage, or disposal facility for lead disposal; G

Lead Waste Management Plan; G

Vacuum filters; G

Clearance Certification; G

SD-11 Closeout Submittals

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

Certification of Medical Examinations; G

Employee Training Certification; G

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

1.5.1.1 Qualifications of CP

Submit name, address, and telephone number of the CP selected to perform

responsibilities specified in paragraph entitled "Competent Person (CP) Responsibilities." Provide previous experience of the CP. Submit proper documentation that the CP is trained and licensed and certified in accordance with Federal, State, and local laws.

1.5.1.2 Training Certification

Submit a certificate for each employee and supervisor, signed and dated by the authorized training provider meeting 40 CFR 745 (Subpart L) requirements, stating that the employee or supervisor has received the required lead training and is certified to perform or supervise deleading or lead removal.

1.5.1.3 Testing Laboratory

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

1.5.1.4 Third Party Consultant Qualifications

Submit the name, address, and telephone number of the third party consultant selected to perform the wipe sampling for determining concentrations of lead in dust or soil sampling. Submit proper documentation that the consultant is trained and certified as an inspector technician or inspector/risk assessor by the USEPA authorized State (or local) certification and accreditation program.

1.5.2 Requirements

1.5.2.1 Competent Person (CP) Responsibilities

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

b. Review and approve lead-based paint/paint with lead removal/control plan for conformance to the applicable standards. Ensure work is performed in strict accordance with specifications at all times.

c. Continuously inspect lead-based paint removal/control work for conformance with the approved plan.

d. Perform air and wipe sampling.

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

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

1.5.2.2 Lead-Based Paint/Paint with Lead Removal/Control Plan (LBP/PWL R/CP)

Submit a detailed job-specific plan of the work procedures to be used in

the removal/control of LBP/PWL. The plan shall include a sketch showing the location, size, and details of lead control areas, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, controls and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and paint debris disposal plan, air sampling plan, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside the lead control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training, sampling methodology, frequency, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multi-contractor worksites to inform affected employees and to clarify responsibilities to control exposures.

1.5.2.3 Occupational and Environmental Assessment Data Report

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

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

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

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

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

1.5.2.4 Medical Examinations

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

employees for a period of at least 30 years or for the duration of employment plus 30 years, whichever is longer.

1.5.2.5 Training

Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, and State and local regulations where appropriate.

1.5.2.6 Respiratory Protection Program

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

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

1.5.2.7 Hazard Communication Program

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

1.5.2.8 Lead Waste Management

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

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

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

c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of proof of EPA State and local hazardous waste permit applications and EPA Identification numbers.

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

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

f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.

g. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily. Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers.

h. Unit cost for waste disposal according to this plan.

1.5.3 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the lead waste management plan and the lead-based paint/paint with lead removal/control plan, including work procedures and precautions for the removal plan.

1.6 EQUIPMENT

1.6.1 Respirators

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

1.6.2 Special Protective Clothing

Furnish personnel who will be exposed to lead-contaminated dust with proper uncontaminated, reusable protective whole body clothing, head covering, gloves, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

1.6.3 Rental Equipment Notification

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

1.6.4 Vacuum Filters

UL 586 labeled HEPA filters.

1.6.5 Equipment for Government Personnel

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

1.7 PROJECT/SITE CONDITIONS

1.7.1 Protection of Existing Work to Remain

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

PART 2 PRODUCTS

Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection

3.1.1.1 Notification

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

3.1.1.2 Boundary Requirements

a. Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead will not escape outside the lead control area.

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

3.1.1.3 Heating, Ventilating and Air Conditioning (HVAC) Systems

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

3.1.1.4 Decontamination Shower Facility

Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

3.1.1.5 Eye Wash Station

Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.

3.1.1.6 Mechanical Ventilation System

a. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62.

b. To the extent feasible, use local exhaust ventilation connected to HEPA filters or other collection systems, approved by the CP. Local exhaust ventilation systems shall be evaluated and maintained in accordance with 29 CFR 1926.62.

c. Vent local exhaust outside the building only and away from building ventilation intakes.

d. Use locally exhausted, power actuated, paint removal tools.

3.1.1.7 Personnel Protection

Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

3.2 ERECTION

3.2.1 Lead Control Area Requirements

Establish a lead control area by situating critical barriers and physical boundaries around the area or structure where LBP/PWL removal/control operations will be performed.

3.3 APPLICATION

3.3.1 Work Procedures

Perform removal of lead-based paint in accordance with approved lead-based paint/paint with lead removal/control plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-based paint is removed in accordance with 29 CFR 1926.62. Dispose of removed paint chips and associated waste in compliance with Environmental Protection Agency (EPA), State, and local requirements.

3.3.2 Lead-Based Paint Removal/Control/Deleading

Manual or power sanding of interior and exterior surfaces is not permitted unless tools are equipped with HEPA attachments or wet methods. The dry sanding or grinding of surfaces that contain lead is prohibited Provide methodology for LBP removal/control in work plan. Remove paint within the areas designated on the drawings in order to completely expose the substrate. Take whatever precautions necessary to minimize damage to the underlying substrate.

Avoid flash rusting of the substrate.

Provide methodology for LBP/PWL removal and processes to minimize contamination of work areas outside the control area with lead-contaminated dust or other lead-contaminated debris/waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this LBP/PWL removal/control process in the LBP/PWL R/CP.

3.3.2.1 Indoor Paint Removal

Perform manual paint removal in lead control areas using enclosures, barriers, or containments . Collect residue for disposal in accordance with federal, State, and local requirements.

3.3.2.2 Outdoor Paint Removal

Perform outdoor removal as indicated in federal, State, and local regulations and in the LBP/CPR/CP. The worksite preparation (barriers or containments) shall be job dependent and presented in the LBP/PWL R/CP.

3.3.3 Personnel Exiting Procedures

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

a. Vacuum themselves off.

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

d. Change to clean clothes prior to leaving the physical boundary designated around the lead control area.

3.4 FIELD QUALITY CONTROL

3.4.1 Tests

3.4.1.1 Air and Wipe Sampling

Air sample for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling shall be directed or performed by the CP.

a. The CP shall be on the job site directing the air and non-clearance wipe sampling and inspecting the lead-based paint removal/control work to ensure that the requirements of the contract have been satisfied during the entire lead-based paint removal operation.

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

c. Submit results of air samples, within 72 hours after the air samples are taken.

3.4.1.2 Air Sampling During Paint Removal Work

Conduct area air sampling daily, on each shift in which lead-based paint removal operations are performed, in areas immediately adjacent to the lead control area. Sufficient area monitoring shall be conducted to ensure unprotected personnel are not exposed at or above 30 micrograms per cubic meter of air. If 30 micrograms per cubic meter of air is reached or exceeded, stop work, correct the conditions(s) causing the increased levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Removal work shall resume only after the CP and the Contracting Officer give approval. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area.

3.4.1.3 Sampling After Paint Removal/Control

After the visual inspection, conduct soil sampling if bare soil is present during external removal/control operations and collect wipe samples according to the HUD protocol contained in HUD 6780 to determine the lead content of settled dust and dirt in micrograms per square meter foot of

surface area .

3.4.1.4 Testing of Removed Paint and Used Abrasive

Test removed paint and used abrasive in accordance with 40 CFR 261 for hazardous waste.

3.5 CLEANING AND DISPOSAL

3.5.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the CP. Reclean areas showing dust or residual paint chips or debris. After visible dust, chips and debris is removed, wet wipe and HEPA vacuum all surfaces in the work area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP shall then certify in writing that the area has been cleaned of lead contamination before restarting work.

3.5.1.1 Clearance Certification

The CP shall certify in writing that air samples collected outside the lead control area during paint removal operations are less than 30 micrograms per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62 and 40 CFR 745; and that there were no visible accumulations of material and dust containing lead left in the work site. Do not remove the lead control area or roped off boundary and warning signs prior to the Contracting Officer's acknowledgement of receipt of the CP certification.

For exterior paint removal/control work, soil samples taken at the exterior of the work site shall be used to determine if soil lead levels had increased at a statistically significant level (significant at the 95 percent confidence limit) from the soil lead levels prior to the work. If soil lead levels do show a statistically significant increase or is above any applicable Federal or State standard for lead in soil, the soil shall be remediated back to the pre-work level.

Clear the lead control area in industrial facilities of all visible dust and debris.

For lead-based paint hazard abatement work, surface wipe and soil sampling shall be conducted and clearance determinations made according to the work practice standards presented in 40 CFR 745.227.

3.5.2 Disposal

a. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing that may produce airborne concentrations of lead particles. Label the containers in accordance

with 29 CFR 1926.62 and 40 CFR 262. Dispose of lead-contaminated waste material at an EPA or State approved hazardous waste treatment, storage, or disposal facility off Government property.

b. Place waste materials in U.S. Department of Transportation (49 CFR 178) approved 55 gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. For hazardous waste, the collection drum requires marking/labeling in accordance with 40 CFR 262 during the accumulation/collection timeframe. The Contracting Officer or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.

c. Handle, transport, and dispose lead or lead-contaminated material classified as hazardous waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

d. All material, whether hazardous or non-hazardous shall be disposed in accordance with laws and provisions and Federal, State, or local regulations. Ensure waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

3.5.2.1 Disposal Documentation

Submit written evidence to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA, State or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed and dated by the initial transporter in accordance with 40 CFR 262. Contractor shall provide a certificate that the waste was accepted by the disposal facility.

3.5.3 Payment for Hazardous Waste

Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials or non-hazardous waste delivered is returned and a copy is furnished to the Government.

-- End of Section --

SECTION 02 84 16

HANDLING OF LIGHTING BALLASTS LAMPS CONTAINING PCBs AND MERCURY
04/06

PART 1 GENERAL

1.1 REFERENCES

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

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)

COMAR 26.13	(1988) Chapters .01- .13, Disposal of Controlled Hazardous Substances

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

29 CFR 1910.1000	Air Contaminants
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 273	Standards For Universal Waste Management
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 178	Specifications for Packagings

1.2 REQUIREMENTS

Removal and disposal of PCB containing lighting ballasts and associated mercury-containing lamps. Contractor may encounter leaking PCB ballasts.

1.3 DEFINITIONS

1.3.1 Certified Industrial Hygienist (CIH)

A industrial hygienist hired by the contractor shall be certified by the American Board of Industrial Hygiene.

1.3.2 Leak

Leak or leaking means any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

1.3.3 Lamps

Lamp, also referred to as "universal waste lamp", is defined as the bulb or tube portion of an electric lighting device. A lamp is specifically designed to produce radiant energy, most often in the ultraviolet, visible, and infra-red regions of the electromagnetic spectrum. Examples of common universal waste electric lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide lamps.

1.3.4 Polychlorinated Biphenyls (PCBs)

PCBs as used in this specification shall mean the same as PCBs, PCB containing lighting ballast, and PCB container, as defined in 40 CFR 761, Section 3, Definitions.

1.3.5 Spill

Spill means both intentional and unintentional spills, leaks, and other uncontrolled discharges when the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contamination resulting from those releases.

1.3.6 Universal Waste

Universal Waste means any of the following hazardous wastes that are managed under the universal waste requirements 40 CFR 273:

(1) Batteries as described in Sec. 273.2 of this chapter;
(2) Pesticides as described in Sec. 273.3 of this chapter;
(3) Thermostats as described in Sec. 273.4 of this chapter; and
(4) Lamps as described in Sec. 273.5 of this chapter.

1.4 QUALITY ASSURANCE

1.4.1 Regulatory Requirements

Perform PCB related work in accordance with 40 CFR 761 and COMAR 26.13 . Perform mercury-containing lamps storage and transport in accordance with 40 CFR 261, 40 CFR 264, 40 CFR 265, 40 CFR 273 and COMAR 26.13 .

1.4.2 Training

Certified industrial hygienist (CIH) shall instruct and certify the training of all persons involved in the removal of PCB containing lighting ballasts and mercury-containing lamps. The instruction shall include: The dangers of PCB and mercury exposure, decontamination, safe work practices, and applicable OSHA and EPA regulations. The CIH shall review and approve the PCB and Mercury-Containing Lamp Removal Work Plans.

1.4.3 Regulation Documents

Maintain at all times one copy each at the office and one copy each in view at the job site of 29 CFR 1910.1000, 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 265, 40 CFR 268, 40 CFR 270, 40 CFR 273 and COMAR 26.13 and of the Contractor removal work plan and disposal plan for PCB and for associated mercury-containing lamps.

1.5 SUBMITTALS

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

SD-07 Certificates

Qualifications of CIH; G

Training Certification; G

PCB and Lamp Removal Work Plan; G

PCB and Lamp Disposal Plan; G

SD-11 Closeout Submittals

Transporter certification of notification to EPA of their PCB waste activities and EPA ID numbers; G

Certification of Decontamination

Certificate of Disposal and/or recycling. Submit to the Government before application for payment within 30 days of the date that the disposal of the PCB and mercury-containing lamp waste identified on the manifest was completed.

DD Form 1348-1

1.6 ENVIRONMENTAL REQUIREMENTS

Use special clothing:

a. Disposable gloves (polyethylene)

b. Eye protection

c. PPE as required by CIH

1.7 SCHEDULING

Notify the Contracting Officer 20 days prior to the start of PCB and mercury-containing lamp removal work.

1.8 QUALITY ASSURANCE

1.8.1 Qualifications of CIH

Submit the name, address, and telephone number of the Industrial Hygienist selected to perform the duties in paragraph entitled "Certified Industrial Hygienist." Submit training certification that the Industrial Hygienist is certified, including certification number and date of certification or re certification.

1.8.2 PCB and Lamp Removal Work Plan

Submit a job-specific plan within 20 calendar days after award of contract of the work procedures to be used in the removal, packaging, and storage of PCB-containing lighting ballasts and associated mercury-containing lamps. Include in the plan: Requirements for Personal Protective Equipment (PPE), spill cleanup procedures and equipment, eating, smoking and restroom procedures. The plan shall be approved and signed by the Certified Industrial Hygienist. Obtain approval of the plan by the Contracting Officer prior to the start of PCB and/or lamp removal work.

1.8.3 PCB and Lamp Disposal Plan

Submit a PCB and lamp Disposal Plan with 45 calendar days after award of contract. The PCB and Lamp Disposal Plan shall comply with applicable requirements of federal, state, and local PCB and Universal waste regulations and address:

a. Estimated quantities of wastes to be generated, disposed of, and recycled.

b. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location. Furnish two copies of EPA and state PCB and mercury-containing lamp waste permit applications and EPA identification numbers, as required.

c. Names and qualifications (experience and training) of personnel who will be working on-site with PCB and mercury-containing lamp wastes.

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

e. Work plan and schedule for PCB and mercury-containing lamp waste removal, containment, storage, transportation, disposal and or recycling. Wastes shall be cleaned up and containerize daily.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 WORK PROCEDURE

Furnish labor, materials, services, and equipment necessary for the removal of PCB containing lighting ballasts, associated mercury-containing fluorescent lamps, in accordance with local, state, or federal regulations. Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not break mercury containing fluorescent lamps or high intensity discharge lamps.

3.1.1 Work Operations

Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with 40 CFR 761, 40 CFR 262 40 CFR 263, and the applicable requirements of this section, including but not limited to:

a. Obtaining suitable PCB and mercury-containing lamp storage sites.

b. Notifying Contracting Officer prior to commencing the operation.

c. Reporting leaks and spills to the Contracting Officer.

d. Cleaning up spills.

e. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the Contracting Officer.

f. Maintaining inspection, inventory and spill records.

3.2 PCB SPILL CLEANUP REQUIREMENTS

3.2.1 PCB Spills

Immediately report to the Contracting Officer any PCB spills.

3.2.2 PCB Spill Control Area

Rope off an area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to a drip pan or other container.

3.2.3 PCB Spill Cleanup

40 CFR 761, subpart G. Initiate cleanup of spills as soon as possible, but no later than 24 hours of its discovery. Mop up the liquid with rags or other conventional absorbent. The spent absorbent shall be properly contained and disposed of as solid PCB waste.

3.2.4 Records and Certification

Document the cleanup with records of decontamination in accordance with 40 CFR 761, Section 125, Requirements for PCB Spill Cleanup. Provide test results of cleanup and certification of decontamination.

3.3 REMOVAL

3.3.1 Ballasts

As ballast are removed from the lighting fixture, inspect label on ballast. Ballasts without a "No PCB" label shall be assumed to contain PCBs and containerized and disposed of as required under paragraphs STORAGE FOR DISPOSAL and DISPOSAL. If there are less than 1600 "No PCB" labeled lighting ballasts dispose of them as normal demolition debris.

3.3.2 Lighting Lamps

Remove lighting tubes/lamps from the lighting fixture and carefully place (unbroken) into appropriate containers (original transport boxes or equivalent). In the event of a lighting tube/lamp breaking, sweep and place waste in double plastic taped bags and dispose of as universal waste as specified herein.

3.4 STORAGE FOR DISPOSAL

3.4.1 Storage Containers for PCBs

49 CFR 178. Store PCB in containers approved by DOT for PCB.

3.4.2 Storage Containers for lamps

Store mercury containing lamps in appropriate DOT containers. The boxes shall be stored and labeled for transport in accordance with 40 CFR 273.

3.4.3 Labeling of Waste Containers

Label with the following:

a. Date the item was placed in storage and the name of the cognizant activity/building.

b. "Caution Contains PCB," conforming to 40 CFR 761, CFR Subpart C. Affix labels to PCB waste containers.

c. Label mercury-containing lamp waste in accordance with 40 CFR 273. Affix labels to all lighting waste containers.

3.5 DISPOSAL

Dispose of off Government property in accordance with EPA, DOT, and local regulations at a permitted site.

3.5.1 Identification Number

Federal regulations 40 CFR 761, and 40 CFR 263 require that generators, transporters, commercial storers, and disposers of PCB waste posses U.S. EPA identification numbers. The contractor shall verify that the activity has a U.S. EPA generator identification number for use on the Uniform Hazardous Waste manifest. If not, the contractor shall advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work. For mercury containing lamp removal, Federal regulations

40 CFR 273 require that large quantity handlers of Universal waste (LQHUW) must provide notification of universal waste management to the appropriate EPA Region (or state director in authorized states), obtain an EPA identification number, and retain for three years records of off-site shipments of universal waste. The contractor shall verify that the activity has a U.S. EPA generator identification number for use on the Universal Waste manifest. If not, the contractor shall advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work.

3.5.2 Transporter Certification

Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263. Before transporting the PCB waste, sign and date the manifest acknowledging acceptance of the PCB waste from the Government. Return a signed copy to the Government before leaving the job site. Ensure that the manifest accompanies the PCB waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities (EPA Form 7710-53).

3.5.2.1 Certificate of Disposal and/or Recycling

40 CFR 761. Certificate for the PCBs and PCB items disposed shall include:

a. The identity of the disposal and or recycling facility, by name, address, and EPA identification number.

b. The identity of the PCB waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.

c. A statement certifying the fact of disposal and or recycling of the identified PCB waste, including the date(s) of disposal, and identifying the disposal process used.

d. A certification as defined in 40 CFR 761.

3.5.3 Disposal by the Government

Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263.

3.5.3.1 DD Form 1348-1

Prepare DD Form 1348-1 Turn-in Document (TID), which will accompany the PCB to the storage site. Ensure that a responsible person from the activity that owns the PCB signs the DD Form 1348-1.

-- End of Section --

SECTION 03 01 30.71

CONCRETE REHABILITATION
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 C117	(2013) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C144	(2011) Standard Specification for Aggregate for Masonry Mortar
ASTM C31/C31M	(2012) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33/C33M	(2013) Standard Specification for Concrete Aggregates
ASTM C39/C39M	(2014a) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C881/C881M	(2014) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

1.2 DEFINITIONS

1.2.1 Epoxy Resin Binder

A two-component epoxy bonding system in low and medium viscosities used by itself as a primer or for producing epoxy concrete or mortars when mixed with aggregate.

1.2.2 Epoxy Concrete

A combination of epoxy resin binder and fine and coarse aggregate used in the repair of spalling along joints or cracks, small surface spalls or "popouts."

1.2.3 Epoxy Mortar

A combination of epoxy resin binder and fine aggregate used in the surface repair of non-structural cracks and filling of saw kerfs.

1.2.4 Non-Pressure Epoxy Grout

A combination of epoxy resin binder, a mineral filler and a thixotropic agent used in cementing dowels in place and the repair of non-structural cracks.

1.2.5 Pressure Grouting Epoxy

A low viscosity epoxy resin system pumped under pressure into structural cracks in walls or pavements.

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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-05 Design Data

Job mix formula

SD-06 Test Reports

Sieve analysis test for aggregate

Epoxy resin binder tests

Epoxy grout tests

SD-07 Certificates

Epoxy resin binder

Epoxy grout

SD-08 Manufacturer's Instructions

Epoxy repair material

Submit for mixing and applying.

1.4 QUALITY ASSURANCE

1.4.1 Design Data

1.4.1.1 Job Mix Formula

Submit, at least 15 days before work commences, a job-mix formula for each use of epoxy concrete or epoxy mortar. Test reports shall accompany the mix design. Identify the proposed source of the materials and state the proportions of aggregates and epoxy resin. When determining job mix, use samples of materials to be used on the job.

a. Trial batches: Perform a minimum of three trial batchings in a certified testing laboratory. Try different aggregate-resin proportions to obtain satisfactory placing and finishing

characteristics but keep the proportion by weight of aggregate to epoxy resin binder at least five to one. When mixing, add the fine aggregates first, and then the coarse aggregates. The final trial batch should be sufficiently wet so that some fines will "bleed" to the surface during finishing operations.

b. Supporting criteria: Include in the submittal the following data for each trial batch:

(1) Proportions by weight

(2) Unit weights and specific gravities of constituents

(3) Batch weights

(4) Compressive strengths of 3 by 6 inch cylinders, made in accordance with ASTM C31/C31M, air cured for 7 days and tested in accordance with ASTM C39/C39M. Compressive strength shall be a minimum of 4,000 psi.

(5) Curing time

1.4.2 Test Reports

1.4.2.1 Epoxy Resin Binder

Include the following:

a. Viscosity

b. Consistency

c. Gel time

d. Absorption

e. Shrinkage

f. Thermal compatibility

1.4.2.2 Epoxy Resin Grout

Include the following:

a. Epoxy number

b. Consistency

c. Compressive single shear strength

d. Pot life

1.5 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to site for damage, unload and store with a minimum of handling. Deliver epoxy resin components and aggregate materials in original sealed containers and store in dry covered areas at temperatures below 90 degrees F. Remove from job site unused mixed materials which have reached end of working or pot life.

1.6 WEATHER LIMITATIONS

Halt work when weather conditions detrimentally affect the quality of patching or bonding concrete. Apply epoxy resin materials only when the contact surfaces are completely dry and if the atmospheric and surface temperature ranges are suitable for the specified epoxy material. Follow manufacturer's instructions for weather conditions and temperature ranges.

1.7 TRAFFIC CONTROL

Do not permit vehicular or heavy equipment traffic on the pavement in the work area during the curing period. At the end of the curing period, light local traffic may be permitted on the pavement if approved by the Contracting Officer.

1.8 EQUIPMENT

Use a container recommended by the epoxy manufacturer as the mixing vessel. Use a power drive (air or spark-proof) propeller type blade for mixing except that hand mixing may be used for small batches. Use equipment specified by epoxy manufacturer for field mixing of aggregates and epoxy resin.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Epoxy

2.1.1.1 Epoxy Resin Binder for Concrete and Mortar

ASTM C881/C881M, Type III, Grade 1 , Class B without mineral filler.

2.1.1.2 Non-Pressure Epoxy Grout

ASTM C881/C881M Type IV, Grade 2 , Class B with or without mineral filler.

2.1.1.3 Crack Sealer for Pressure Grouting

ASTM C881/C881M, Type IV, Grade 1, Class B without filler.

2.1.1.4 Crack Surface Sealer for Pressure Grouting

ASTM C881/C881M, Type IV, Grade 3, Class B with mineral filler.

2.1.2 Aggregate

For material passing No. 200 sieve provide a non-plastic material composed of a minimum of 75 percent limestone dust, talc or silica inert filler. Provide dry aggregate.

a. For epoxy concrete: ASTM C33/C33M, maximum size 1/2 inch. Conform to the following requirements:

Sieve Designation	Percent Passing by Weight
1/2 in.	100
3/8 in.	93-100
No. 4	70-80
No. 8	50-65
No. 16	37-53
No. 30	20-37
No. 50	10-20
No. 100	5-10
No. 200	3-5

b. For epoxy mortar: ASTM C144, maximum size . No. 8 sieve .

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Epoxy Concrete

3.1.1.1 Patch Areas

Remove loose concrete from the spalled areas indicated. Inspect the cavity for remaining defective concrete by tapping with a hammer or steel rod and listening for dull or hollow sounds. In areas where tapping does not produce a solid tone, remove additional concrete until testing produces a solid tone. Make the entire cavity at least one inch deep. Sawcut edges of cavity to avoid feather edging. Prepare surface of cavity by sandblasting, grinding, or water blasting. Remove dust, dirt, and loosely bonded material resulting from cleaning. Ensure cavity surfaces are dry.

3.1.1.2 Spalls at Joints and Cracks

For spalls to be repaired that are adjacent to joints and working cracks insert preformed joint filler to the working faces of the spall. Trim filler to fit shape of the working faces of joint or crack so epoxy material is prevented from bypassing filler. Where practicable, extend filler horizontally and vertically into joint or crack opening. Secure filler strip in place prior to and during placement of epoxy concrete. After the epoxy concrete has completely cured, saw out the top inch of the preformed joint filler and install liquid joint sealer in accordance with Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

3.1.1.3 Joints and Cracks

Clean and seal joints and cracks as specified in 32 13 11.

3.1.2 Epoxy Mortar for Cracks and Saw Kerfs

Apply epoxy mortar to newly exposed loose and unsound materials. Prepare surfaces by sandblasting, scarifying or waterblasting. Remove dust, dirt, and loosely bonded material resulting from cleaning. Ensure surfaces are dry before application of epoxy mortar.

3.1.3 Epoxy Grout for Cracks

Apply grout to newly exposed concrete free of loose and unsound materials. Prepare surfaces by sandblasting, scarifying or waterblasting. Remove dust, dirt, and loosely bonded material resulting from cleaning. Ensure surfaces are dry before application of epoxy grout.

3.2 MIXING MATERIALS

Make batches small enough to ensure placement before binder sets. Mix materials in accordance with manufacturer's recommendations.

3.3 PLACEMENT

3.3.1 Epoxy Concrete

Prime dry cavity surfaces with epoxy resin using a stiff bristle brush. Make coating approximately 20 mils thick. Place epoxy concrete while primer is still tacky and in layers not exceeding one inch thick. Use vibratory floats, plates, or hand tampers to consolidate the concrete. Level each layer and screed the final surface to match the adjoining surfaces. Remove excess epoxy concrete on adjacent surfaces before the concrete hardens. Do not feather epoxy concrete out onto adjacent surfaces.

3.3.2 Epoxy Mortar

Prime surfaces with epoxy resin binder. Scrub prime coat into surface with a stiff bristle brush. Make coating approximately 20 mils thick. Place epoxy mortar while primer is still tacky. Apply at a thickness recommended by the manufacturer. Work mortar into place and consolidate thoroughly so that contact surfaces are wetted by the mortar. Finish surface of mortar to the required texture. Do not feather edge epoxy mortar onto adjacent surfaces.

3.3.3 Non-Pressure Epoxy Grout

3.3.3.1 Cementing Dowels

Immediately prior to placing the dowel, clean hole of dust and other deleterious material with a high pressure air hose. Fill hole halfway with grout. Insert dowel in hole by rotating it at least one complete turn while tapping it down. If necessary add more grout to fill hole.

3.3.3.2 Epoxy Grout for Cracks

Apply epoxy grout at a thickness recommended by the manufacturer. Work grout into place and consolidate thoroughly so that contact surfaces are wetted by the grout. Finish surface of grout to the required texture. Do not feather edge epoxy grout onto adjacent surfaces.

3.3.4 Pressure Grouting of Cracks

Clean each crack of dust, dirt, loose concrete and unsound material. Insert a valve at both ends of each crack, at the junction of two cracks, and along the length of each crack at 16 to 20 inch intervals. Fill crack between valves with crack surface sealer. After crack surface sealer has hardened and cured, pump crack sealer into valve at one end of crack. For vertical surfaces start at lowest valve and work upwards. As crack sealer appears at next valve, pinch closed pumping valve and move to next valve and commence pumping. Continue procedure until other end of crack is reached. Avoid delays in pumping operation. After crack sealer has hardened and cured grind valves off flush with concrete surface. Coat areas of valves with crack surface sealer and allow to harden and cure.

3.4 CURING

Cure epoxy materials in accordance with manufacturer's recommendations.

3.5 FIELD QUALITY CONTROL

3.5.1 Sampling

As soon as epoxy resin and aggregate materials are available for sampling, obtain by random selection a sample of each batch. Clearly identify samples by designated name, specification number, batch number, project contract number, intended use and quantity involved.

3.5.2 Testing

At the discretion of the Contracting Officer, samples provided may be tested by the Government for verification. Test samples by an approved laboratory. If a sample fails to meet specification requirements after two tests, replace the batch represented by the samples tested and retest. Test aggregates in accordance with ASTM C117 and ASTM C136/C136M.

3.5.3 Inspection

Check each repaired area for cracks, spalls, popouts and loss of bond between repaired area and surrounding concrete. Check each repaired area for voids by tapping with a hammer or steel rod and listening for dull or hollow sounds. Immediately repair defects.

-- End of Section --

SECTION 03 30 00

CAST-IN-PLACE CONCRETE
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 CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 121R	(2008) Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 211.2	(1998; R 2004) Standard Practice for Selecting Proportions for Structural Lightweight Concrete
ACI 213R	(2014) Guide for Structural Lightweight-Aggregate Concrete
ACI 301	(2010; Errata 2011) Specifications for Structural Concrete
ACI 302.1R	(2004; Errata 2006; Errata 2007) Guide for Concrete Floor and Slab Construction
ACI 304.2R	(1996; R 2008) Placing Concrete by Pumping Methods
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(2010) Guide to Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 306R	(2010) Guide to Cold Weather Concreting
ACI 308.1	(2011) Specification for Curing Concrete
ACI 318	(2014; Errata 1-2 2014) Building Code Requirements for Structural Concrete and Commentary

ACI 347	(2004; Errata 2008; Errata 2012) Guide to Formwork for Concrete
ACI SP-15	(2011) Field Reference Manual: Standard Specifications for Structural Concrete ACI 301-05 with Selected ACI References
ACI SP-66	(2004) ACI Detailing Manual

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995; R 2004) Basic Hardboard

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1064/A1064M	(2014) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A615/A615M	(2014) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C1077	(2014) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C1107/C1107M	(2014) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1157/C1157M	(2011) Standard Specification for Hydraulic Cement
ASTM C1260	(2014) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C138/C138M	(2014) Standard Test Method for Density ("Unit Weight"), Yield, and Air Content (Gravimetric) of Concrete
ASTM C143/C143M	(2012) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2012) Standard Specification for Portland Cement
ASTM C1602/C1602M	(2012) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete

ASTM C172/C172M	(2014a) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2014) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C192/C192M	(2014) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C231/C231M	(2014) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C295/C295M	(2012) Petrographic Examination of Aggregates for Concrete
ASTM C31/C31M	(2012) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C311/C311M	(2013) Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
ASTM C33/C33M	(2013) Standard Specification for Concrete Aggregates
ASTM C330/C330M	(2014) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C39/C39M	(2014a) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42/C42M	(2013) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C494/C494M	(2013) Standard Specification for Chemical Admixtures for Concrete
ASTM C567/C567M	(2014) Determining Density of Structural Lightweight Concrete
ASTM C595/C595M	(2014) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2012a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C78/C78M	(2012; E 2013) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants
ASTM C94/C94M	(2014b) Standard Specification for Ready-Mixed Concrete
ASTM C989/C989M	(2014) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2004a; R 2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D5759	(2012) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
ASTM D6690	(2012) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM E1643	(2011) Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
ASTM E1745	(2011) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
ASTM E96/E96M	(2014) Standard Test Methods for Water Vapor Transmission of Materials

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2009; 28th Ed) Manual of Standard Practice

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1	(2009) DOC Voluntary Product Standard PS 1-07, Structural Plywood

1.2 DEFINITIONS

a. "Cementitious material" as used herein must include all portland cement, pozzolan, fly ash,and ground granulated blast-furnace slag.

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.

d. "Supplementary cementing materials" (SCM) include coal fly ash, granulated blast-furnace slag, natural or calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the portland cement that result in improvement to sustainability and durability and reduced cost.

e. "Design strength" (f'c) is the specified compressive strength of concrete at time(s) specified in this section to meet structural design criteria.

f. "Mass Concrete" is any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a section thickness of 3 feet or more regardless of temperature.

g. "Mixture proportioning" is the process of designing concrete mixture proportions to enable it to meet the strength, service life and constructability requirements of the project while minimizing the initial and life-cycle cost.

h. "Mixture proportions" are the masses or volumes of individual ingredients used to make a unit measure (cubic yard) of concrete.

i. "Pozzolan" is a siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

j. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

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. 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

Concrete Curing Plan
Quality Control Plan; G
Quality Control Personnel Certifications; G
Quality Control Organizational Chart
Laboratory Accreditation; G
Form Removal Schedule; G

SD-02 Shop Drawings

Formwork

Reinforcing steel; G

SD-03 Product Data

Joint sealants
Joint filler
Materials for Forms
Cementitious Materials
Vapor barrier
Concrete Curing Materials
Reinforcement
Admixtures
Mechanical Reinforcing Bar Connectors
Pumping Concrete

SD-05 Design Data

Concrete mix design; G

SD-06 Test Reports

Concrete mix design; G

Fly ash

Pozzolan

Ground granulated blast-furnace slag

Aggregates

Compressive strength tests; G
Unit weight of structural concrete

Air Content

Slump Tests

Water

SD-07 Certificates

Reinforcing Bars

Welder Qualifications

SD-08 Manufacturer's Instructions

Curing Compound

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301 and ACI 304R requirements and recommendations. Do not deliver concrete until vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.6 QUALITY ASSURANCE

1.6.1 Design Data

1.6.1.1 Concrete Mix Design

Sixty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type, brand, source and amount of cement, complementary cementitious materials, , and admixtures; and applicable reference specifications. Submit mill test and all other test for cement, complementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. For previously approved concrete mix designs used within the past twelve months, the previous mix design may be re-submitted without further trial batch testing if accompanied by material test data conducted within the last six months. Obtain mix design approval from the contracting officer prior to concrete placement.

1.6.2 Shop Drawings

1.6.2.1 Formwork

Drawings showing details of formwork including, but not limited to; joints, supports, studding and shoring, and sequence of form and shoring removal. Indicate placement schedule, construction, location and method of forming control joints. Include locations of inserts, conduit, sleeves and other embedded items. Reproductions of contract drawings are unacceptable. Submit form removal schedule indicating element and minimum length of time for form removal.

Design, fabricate, erect, support, brace, and maintain formwork so that it

is capable of supporting without failure all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork.

1.6.2.2 Reinforcing Steel

ACI SP-66. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars. Reproductions of contract drawings are unacceptable.

1.6.3 Control Submittals

1.6.3.1 Concrete Curing Plan

Submit proposed materials, methods and duration for curing concrete elements in accordance with ACI 308.1.

1.6.3.2 Pumping Concrete

Submit proposed materials and methods for pumping concrete. Submittal must include mix designs, pumping equipment including type of pump and size and material for pipe, and maximum length and height concrete is to be pumped.

1.6.4 Test Reports

1.6.4.1 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C618 for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

1.6.4.2 Ground Granulated Blast-Furnace Slag

Submit test results in accordance with ASTM C989/C989M for ground granulated blast-furnace slag. Submit test results performed within 6 months of submittal date.

1.6.4.3 Aggregates

ASTM C1260 for potential alkali-silica reactions, ASTM C295/C295M for petrographic analysis.

1.6.5 Quality Control Plan

Develop and submit for approval a concrete quality control program in accordance with the guidelines of ACI 121R and as specified herein. The plan must include approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. All quality control reports must be provided to the Contracting Officer, Quality Manager and Concrete Supplier. Maintain a copy of ACI SP-15 and CRSI 10MSP at project site.

1.6.6 Quality Control Personnel Certifications

The Contractor must submit for approval the responsibilities of the various quality control personnel, including the names and qualifications of the individuals in those positions and a quality control organizational chart defining the quality control hierarchy and the responsibility of the various positions. Quality control personnel must be employed by the

Contractor.

Submit American Concrete Institute certification for the following:

a. CQC personnel responsible for inspection of concrete operations.

b. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews.

c. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

1.6.6.1 Quality Manager Qualifications

The quality manager must hold a current license as a professional engineer in a U.S. state or territory with experience on at least five (5) similar projects. Evidence of extraordinary proven experience may be considered by the Contracting Officer as sufficient to act as the Quality Manager.

1.6.7 Laboratory Qualifications for Concrete Qualification Testing

The concrete testing laboratory must have the necessary equipment and experience to accomplish required testing. The laboratory must meet the requirements of ASTM C1077 and be Cement and Concrete Reference Laboratory (CCRL) inspected.

1.6.8 Laboratory Accreditation

Laboratory and testing facilities must be provided by and at the expense of the Contractor. The laboratories performing the tests must be accredited in accordance with ASTM C1077, including ASTM C78/C78M and ASTM C1260. The accreditation must be current and must include the required test methods, as specified. Furthermore, the testing must comply with the following requirements:

a. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies must be performed by an accredited laboratory and under the direction of a registered professional engineer in a U.S. state or territory competent in concrete materials who is competent in concrete materials and must sign all reports and designs.

b. Acceptance Testing: Furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by ASTM C31/C31M.

c. Contractor Quality Control: All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

1.7 QUALIFICATIONS FOR WELDING WORK

Welding procedures must be in accordance with AWS D1.4/D1.4M.

Verify that Welder qualifications are in accordance with AWS D1.4/D1.4M or under an equivalent qualification test approved in advance. Welders are permitted to do only the type of welding for which each is specifically qualified.

PART 2 PRODUCTS

2.1 MATERIALS FOR FORMS

Provide wood, plywood, plastic, carton, or steel. Use plywood or steel forms where a smooth form finish is required.

2.1.1 Wood Forms

Use lumber as specified in Section 06 10 00 ROUGH CARPENTRY and as follows. Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with NIST PS 1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining. Submit data verifying that composite wood products contain no urea formaldehyde resins. Virgin wood used must be FSC-certified.

2.1.1.1 Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to NIST PS 1, B-B, concrete form, not less than 5/8-inch thick.

2.1.1.2 Overlaid Concrete Form Plywood (Standard Smooth)

Provide plywood that conforms to NIST PS 1, B-B, high density form overlay, not less than 5/8-inch thick.

2.1.2 Steel Forms

Provide steel form surfaces that do not contain irregularities, dents, or sags.

2.2 FORM TIES AND ACCESSORIES

Provide a form tie system that does not leave mild steel after break-off or removal any closer than 2 inches from the exposed surface. Do not use wire alone. Form ties and accessories must not reduce the effective cover of the reinforcement.

2.3 CONCRETE MIX DESIGN

2.3.1 Contractor-Furnished Mix Design

ACI 211.1, ACI 301, and ACI 318 and ACI 211.2, ACI 304.2R andACI 213R except as otherwise specified. Indicate the compressive strength (f'c) of the concrete for each portion of the structure(s) as specified below. Where faster set time is required, use Type III cement before using calcium chloride with approval from the contracting officer.

2.3.1.1 Footings

Proportion normal-weight concrete mixture as follows:

a. Minimum Compressive Strength: 4000 psi at 28 days.

b. Maximum Water-Cementitious Materials Ratio: 0.50.

c. Slump Limit: 4 inches plus or minus 1 inch.

e. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1 inch nominal maximum aggregate size.

2.3.1.2 Slab-on-Grade

Proportion normal-weight concrete mixture as follows:

a. Minimum Compressive Strength: 4000 psi at 28 days.

b. Maximum Water-Cementitious Materials Ratio: 0.45 .

c. Slump Limit: 4 inches, plus or minus 1 inch.

e. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1 inch nominal maximum aggregate size.

f. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.3.1.3 Mix Proportions for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified are the responsibility of the Contractor. Base mixture proportions on compressive strength as determined by test specimens fabricated in accordance with ASTM C192/C192M and tested in accordance with ASTM C39/C39M. Samples of all materials used in mixture proportioning studies must be representative of those proposed for use in the project and must be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Base trial mixtures having proportions, and consistencies suitable for the work on methodology described in ACI 211.1. In the trial mixture, use at least three different water-cementitious material ratios for each type of mixture, which must produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cementitious material ratio allowed must be based on equivalent water-cementitious material ratio calculations as determined by the conversion from the weight ratio of water to cement plus pozzolan by weight equivalency method. Design laboratory trial mixture for maximum permitted slump and air content. Each combination of material proposed for use must have separate trial mixture, except for accelerator or retarder use can be provided without separate trial mixture. Report the temperature of concrete in each trial batch. For each water-cementitious material ratio, at least three test cylinders for each test age must be made and cured in accordance with ASTM C192/C192M and tested in accordance with ASTM C39/C39M for 7 and 28 days. From these results, plot a curve showing the relationship between water-cementitious material ratio and strength for each set of trial mix studies. In addition, plot a curve showing the relationship between 7 and 28 day strengths.

2.3.1.4 Lightweight Concrete Proportion

ACI 211.2, using weight method. Provide ASTM C330/C330M aggregates for concrete.

2.3.1.5 Required Average Strength of Mix Design

The selected mixture must produce an average compressive strength exceeding the specified strength by the amount indicated in ACI 301, but may not

exceed the specified strength at the same age by more than 20 percent. When a concrete production facility has a record of at least 15 consecutive tests, the standard deviation must be calculated and the required average compressive strength must be determined in accordance with ACI 301.

2.3.2 Ready-Mix Concrete

Provide concrete that meets the requirements of ASTM C94/C94M.

Ready-mixed concrete manufacturer must provide duplicate delivery tickets with each load of concrete delivered. Provide delivery tickets with the following information in addition to that required by ASTM C94/C94M:

Type and brand cement

Cement and complementary cementitious materials content in 94-pound bags per cubic yard of concrete

Maximum size of aggregate

Amount and brand name of admixtures

Total water content expressed by water cementitious material ratio

2.3.3 Concrete Curing Materials

Provide concrete curing material in accordance with ACI 301 Section 5 and ACI 308.1 Section 2. Submit product data for concrete curing compounds. Submit manufactures instructions for placement of curing compound.

2.4 MATERIALS

2.4.1 Cementitious Materials

For exposed concrete, use one manufacturer and one source for each type of cement, ground slag, fly ash, and pozzolan.

2.4.1.1 Fly Ash

ASTM C618, Class F, except that the maximum allowable loss on ignition must not exceed 6 percent. Class F fly ash for use in mitigating Alkali-Silica Reactivity must have a Calcium Oxide (CaO) content of less than 8 percent and a total equivalent alkali content less than 1.5 percent.

Add with cement. Fly ash content must be a minimum of 20 percent by weight of cementitious material, provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Where the use of fly ash cannot meet the minimum level, provide the maximum amount of fly ash permittable that meets the code requirements for cement content. Report the chemical analysis of the fly ash in accordance with ASTM C311/C311M. Evaluate and classify fly ash in accordance with ASTM D5759.

2.4.1.2 Raw or Calcined Natural Pozzolan

Natural pozzolan must be raw or calcined and conform to ASTM C618, Class N, including the optional requirements for uniformity and effectiveness in controlling Alkali-Silica reaction and must have an ignition loss not exceeding 3 percent. Class N pozzolan for use in mitigating Alkali-Silica

Reactivity must have a Calcium Oxide (CaO) content of less than 13 percent and total equivalent alkali content less than 3 percent.

2.4.1.3 Ultra Fine Fly Ash and Ultra Fine Pozzolan

Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) must conform to ASTM C618, Class F or N, and the following additional requirements:

a. The strength activity index at 28 days of age must be at least 95 percent of the control specimens.

b. The average particle size must not exceed 6 microns.

c. The sum of SiO2 + Al2O3 + Fe2O3 must be greater than 77 percent.

2.4.1.4 Ground Granulated Blast-Furnace Slag

ASTM C989/C989M, Grade 120. Slag content must be a minimum of 25 percent by weight of cementitious material.

2.4.1.5 Portland Cement

Provide cement that conforms to ASTM C150/C150M, Type II with tri-calcium aluminates (C3A) content less than 10 percent and a maximum cement-alkali content of 0.80 percent Na2Oe (sodium oxide) equivalent. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

2.4.1.6 Blended Cements

Blended cement must conform to ASTM C595/C595M and ASTM C1157/C1157M, Type IP or IS, including the optional requirement for mortar expansion and consist of a mixture of ASTM C150/C150M Type I, or Type II cement and a complementary cementing material. The slag added to the Type IS blend must be ASTM C989/C989M ground granulated blast-furnace slag. The pozzolan added to the Type IP blend must be ASTM C618 Class F and must be interground with the cement clinker. The manufacturer must state in writing that the amount of pozzolan in the finished cement will not vary more than plus or minus 5 mass percent of the finished cement from lot-to-lot or within a lot. The percentage and type of mineral admixture used in the blend must not change from that submitted for the aggregate evaluation and mixture proportioning.

2.4.2 Water

Water must comply with the requirements of ASTM C1602/C1602M. Minimize the amount of water in the mix. Improve workability by adjusting the grading rather than by adding water. Water must be potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete. Submit test report showing water complies with ASTM C1602/C1602M.

2.4.3 Aggregates

ASTM C33/C33M, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Provide aggregates that do not contain any substance which may be deleteriously reactive with the alkalies in the cement. Submit test report showing compliance with ASTM C33/C33M.

Aggregates must not possess properties or constituents that are known to have specific unfavorable effects in concrete when tested in accordance

with ASTM C295/C295M.2.4.3.1 Aggregates for Lightweight Concrete

ASTM C330/C330M.

2.4.4 Nonshrink Grout

ASTM C1107/C1107M.

2.4.5 Admixtures

ASTM C494/C494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures. Submit product data for admixtures used in concrete.

2.4.5.1 Air-Entraining

ASTM C260/C260M.

2.4.5.2 High Range Water Reducer (HRWR) (Superplasticizers)

ASTM C494/C494M, Type F.

2.4.6 Vapor Barrier

ASTM E1745 Class C polyethylene sheeting, minimum 10 mil thickness or other equivalent material with a maximum permeance rating of 0.04 perms per ASTM E96/E96M.

2.4.7 Expansion/Contraction Joint Filler
ASTM D1751 or ASTM D1752 Type I or II. Material must be 1/2 inch thick, unless otherwise indicated.

2.4.8 Joint Sealants

Submit manufacturer's product data, indicating VOC content.

2.4.8.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D6690 or ASTM C920, Type M, Class 25, Use T.

2.4.8.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C920, Type M, Grade NS, Class 25, Use T

2.5 REINFORCEMENT

2.5.1 Reinforcing Bars

ACI 301 unless otherwise specified. Use deformed steel. ASTM A615/A615M with the bars marked A, Grade 60. Submit mill certificates for reinforcing bars.

2.5.2 Mechanical Reinforcing Bar Connectors

ACI 301. Provide 125 percent minimum yield strength of the reinforcement bar.

2.5.3 Wire

2.5.3.1 Welded Wire Reinforcement

ASTM A1064/A1064M. Provide flat sheets of welded wire reinforcement for slabs and toppings.

2.5.3.2 Steel Wire

Wire must conform to ASTM A1064/A1064M.

2.5.4 Reinforcing Bar Supports

Supports include bolsters, chairs, spacers, and other devices necessary for proper spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place.

Provide wire bar type supports of coated or non-corrodible material conforming to ACI SP-66 and CRSI 10MSP.

Legs of supports in contact with formwork must be hot-dip galvanized, or plastic coated after fabrication, or stainless-steel bar supports.

PART 3 EXECUTION

3.1 EXAMINATION

Do not begin installation until substrates have been properly constructed; verify that substrates are level.

If substrate preparation is the responsibility of another installer, notify Contracting Officer of unsatisfactory preparation before processing.

Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Contracting Officer and wait for instructions before beginning installation.

3.2 PREPARATION

Determine quantity of concrete needed and minimize the production of excess concrete. Designate locations or uses for potential excess concrete before the concrete is poured.

3.2.1 General

Surfaces against which concrete is to be placed must be free of debris, loose material, standing water, snow, ice, and other deleterious substances before start of concrete placing.

Remove standing water without washing over freshly deposited concrete. Divert flow of water through side drains provided for such purpose.

3.2.2 Subgrade Under Foundations and Footings

When subgrade material is semiporous and dry, sprinkle subgrade surface with water as required to eliminate suction at the time concrete is deposited, or seal subgrade surface by covering surface with specified vapor retarder. When subgrade material is porous, seal subgrade surface by covering surface with specified vapor retarder.

3.2.3 Subgrade Under Slabs on Ground

Before construction of slabs on ground, have underground work on pipes and conduits completed and approved.

Previously constructed subgrade or fill must be cleaned of foreign materials.

Finish surface of capillary water barrier under interior slabs on ground must not show deviation in excess of 1/4 inch when tested with a 10-foot straightedge parallel with and at right angles to building lines.

Finished surface of subgrade or fill under exterior slabs on ground must not be more than 0.02-foot above or 0.10-foot below elevation indicated.

3.2.4 Edge Forms and Screed Strips for Slabs

Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

3.2.5 Reinforcement and Other Embedded Items

Secure reinforcement, joint materials, and other embedded materials in position, inspected, and approved before start of concrete placing.

3.3 FORMS

Provide forms, shoring, and scaffolding for concrete placementin accordance with ACI 301 Section 2 and 5 and ACI 347. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris.

3.3.1 Coating

Before concrete placement, coat the contact surfaces of forms with a form release agent.

3.3.2 Reshoring

Reshore concrete elements in accordance with ACI 301 Section 2.

3.3.3 Reuse

Reuse forms providing the structural integrity of concrete and the aesthetics of exposed concrete are not compromised. Wood forms must not be clogged with paste and must be capable of absorbing high water-cementitious material ratio paste.

3.3.4 Forms for Standard Rough Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-1.0, for formed surfaces that are to be concealed by other construction.

3.3.5 Forms for Standard Smooth Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-3.0, for formed surfaces that are exposed to view. Do not provide mockup of concrete surface appearance and texture.

3.3.6 Form Ties

Provide ties in accordance with ACI 301 section 2.

3.3.7 Tolerances for Form Construction

Construct formwork to ensure that after removal of forms and prior to patching and finishing of formed surfaces, provide concrete surfaces in accordance with tolerances specified in ACI 301 Section 5 and ACI 117.

3.3.8 Removal of Forms and Supports

After placing concrete, removal of forms must be in accordance with ACI 301 Section 2 except as modified by approved form removal schedule.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

ACI 301 and ACI SP-66. Provide bars, welded wire reinforcement, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement must not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

3.4.1 General

Provide details of reinforcement that are in accordance with ACI 301 and ACI SP-66 and as specified.

3.4.2 Vapor Barrier

Install in accordance with ASTM E1643. Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 12 inches and tape. Remove torn, punctured, or damaged vapor barrier material and provide with new vapor barrier prior to placing concrete. Concrete placement must not damage vapor barrier material.

3.4.3 Reinforcement Supports

Support reinforcement in accordance with ACI 301 Section 3.

3.4.4 Splicing

As indicated. For splices not indicated ACI 301. Do not splice at points of maximum stress. Overlap welded wire reinforcement the spacing of the cross wires, plus 2 inches.

3.4.5 Future Bonding

Plug exposed, threaded, mechanical reinforcement bar connectors with a

greased bolt. Provide bolt threads that match the connector. Countersink the connector in the concrete. Caulk the depression after the bolt is installed.

3.4.6 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement and support against displacement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.7 Fabrication

Shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

Provide fabrication tolerances that are in accordance with ACI 318 and ACI SP-66.

Provide hooks and bends that are in accordance with ACI 318 and ACI SP-66.

Reinforcement must be bent cold to shapes as indicated. Bending must be done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending must be in accordance with standard approved practice and by approved machine methods.

Tolerance on nominally square-cut, reinforcing bar ends must be in accordance with ACI SP-66.

Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

Do not use reinforcement that has any of the following defects:

a. Bar lengths, depths, and bends beyond specified fabrication tolerances

b. Bends or kinks not indicated on drawings or approved shop drawings

c. Bars with reduced cross-section due to rusting or other cause

Replace defective reinforcement with new reinforcement having required shape, form, and cross-section area.

3.4.8 Placing Reinforcement

Place reinforcement in accordance with ACI 301 and ACI SP-66.

For slabs on grade (over earth or over capillary water barrier) and for footing reinforcement, support bars or welded wire reinforcement on precast concrete blocks, spaced at intervals required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

For slabs other than on grade, supports for which any portion is less than 1 inch from concrete surfaces that are exposed to view or to be painted must be of precast concrete units, plastic-coated steel, or stainless steel protected bar supports. Precast concrete units must be wedge shaped, not

larger than 3-1/2 by 3-1/2 inches, and of thickness equal to that indicated for concrete protection of reinforcement. Provide precast units that have cast-in galvanized tie wire hooked for anchorage and blend with concrete surfaces after finishing is completed.

Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

Provide supports for reinforcing bars that are sufficient in number and have sufficient strength to carry the reinforcement they support, and in accordance with ACI 318, ACI SP-66 and CRSI 10MSP. Do not use supports to support runways for concrete conveying equipment and similar construction loads.

Equip supports on ground and similar surfaces with sand-plates.

Support welded wire reinforcement as required for reinforcing bars.

Secure reinforcements to supports by means of tie wire. Wire must be black, soft iron wire, not less than 16 gage.

Reinforcement must be accurately placed, securely tied at intersections, and held in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing of supports must conform to ACI SP-66.

Bending of reinforcing bars partially embedded in concrete is permitted only as specified in ACI SP-66 and ACI 318.

3.4.9 Spacing of Reinforcing Bars

Spacing must be as indicated. If not indicated, spacing must be in accordance with the ACI 318 and ACI SP-66.

Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to preapproval by the Contracting Officer.

3.4.10 Concrete Protection for Reinforcement

Concrete protection must be in accordance with the ACI 318 and ACI SP-66.

3.4.11 Welding

Welding must be in accordance with AWS D1.4/D1.4M.

3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

ASTM C94/C94M, ACI 301, ACI 302.1R and ACI 304R, except as modified herein. Batching equipment must be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

3.5.1 Measuring

Make measurements at intervals as specified in paragraphs SAMPLING and TESTING.

3.5.2 Mixing

ASTM C94/C94M, ACI 301 and ACI 304R. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 84 degrees F. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and water-cementitious material ratio are not exceeded and the required concrete strength is still met. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

3.5.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.6 PLACING CONCRETE

Place concrete in accordance with ACI 301 Section 5.

3.6.1 Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the Contracting Officer. Excavation width must be a minimum of 4 inches greater than indicated.

3.6.2 Pumping

ACI 304R and ACI 304.2R. Pumping must not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment must not exceed 2 inches at discharge/placement. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of course aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

3.6.2.1 Pumping Lightweight Concrete

ACI 213R. Presoak or presaturate aggregates. Cement content must be minimum of 564 pounds per cubic yard and be sufficient to accommodate a 4 to 6 inch slump. Make field trial run in accordance with ACI 213R.

3.6.3 Cold Weather

ACI 306.1. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 37 degrees F in any 1 hour and 50 degrees F per 24 hours after heat application.

3.6.4 Hot Weather

Maintain required concrete temperature using Figure 4.2 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.6.5 Bonding

Surfaces of set concrete at joints, must be roughened and cleaned of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, nor damaged concrete at the surface.

Obtain bonding of fresh concrete that has set as follows:

At joints between footings and walls or columns, between walls or columns and the beams or slabs they support, and elsewhere unless otherwise specified; roughened and cleaned surface of set concrete must be dampened, but not saturated, immediately prior to placing of fresh concrete.

At joints in exposed-to-view work; at vertical joints in walls; at joints near midpoint of span in girders, beams, supported slabs, other structural members; in work designed to contain liquids; the roughened and cleaned surface of set concrete must be dampened but not saturated and covered with a cement grout coating.

Provide cement grout that consists of equal parts of portland cement and fine aggregate by weight with not more than 6 gallons of water per sack of cement. Apply cement grout with a stiff broom or brush to a minimum thickness of 1/16 inch. Deposit fresh concrete before cement grout has attained its initial set.

3.7 WASTE MANAGEMENT

Provide as specified in the Waste Management Plan and as follows.

3.7.1 Mixing Equipment

Before concrete pours, designate on-site area to be paved later in project for cleaning out concrete mixing trucks. Minimize water used to wash equipment.

3.8 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.8.1 Defects

Repair surface defects in accordance with ACI 301 Section 5.

3.8.2 Not Against Forms (Top of Walls)

Surfaces not otherwise specified must be finished with wood floats to even surfaces. Finish must match adjacent finishes.

3.8.3 Formed Surfaces

3.8.3.1 Tolerances

ACI 117 and as indicated.

3.8.3.2 As-Cast Rough Form

Provide for surfaces not exposed to public view a surface finish SF-1.0. Patch holes and defects in accordance with ACI 301.

3.8.3.3 Standard Smooth Finish

Provide for surfaces exposed to public view a surface finish SF-3.0. Patch holes and defects in accordance with ACI 301.

3.9 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

ACI 301 and ACI 302.1R, unless otherwise specified.

3.9.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.9.1.1 Scratched

Use for surfaces intended to receive bonded applied cementitious applications. Finish concrete in accordance with ACI 301 Section 5 for a scratched finish.

3.9.1.2 Floated

Use for surfaces to receive roofing, waterproofing membranes, and exterior slabs where not otherwise specified. Finish concrete in accordance with ACI 301 Section 5 for a floated finish.

3.9.1.3 Broomed

Use on surfaces of exterior walks, platforms, patios, and ramps, unless otherwise indicated. Finish concrete in accordance with ACI 301 Section 5 for a broomed finish.

3.9.2 Splash Blocks

Provide at outlets of downspouts emptying at grade. Splash blocks may be precast concrete, and must be 24 inches long, 12 inches wide and 4 inches thick, unless otherwise indicated, with smooth-finished countersunk dishes sloped to drain away from the building.

3.10 JOINTS

3.10.1 Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Joints must be perpendicular to main reinforcement. Reinforcement must be continued and developed across construction joints. Locate construction joints as follows:

3.10.1.1 Maximum Allowable Construction Joint Spacing

a. In walls at not more than 60 feet in any horizontal direction.

b. In slabs on ground, so as to divide slab into areas not in excess of 1,200 square feet.

3.10.1.2 Construction Joints for Constructability Purposes

a. In walls, at top of footing; at top of slabs on ground; at top and bottom of door and window openings or where required to conform to architectural details; and at underside of deepest beam or girder framing into wall.

b. In columns or piers, at top of footing; at top of slabs on ground; and at underside of deepest beam or girder framing into column or pier.

c. Near midpoint of spans for supported slabs, beams, and girders unless a beam intersects a girder at the center, in which case construction joints in girder must offset a distance equal to twice the width of the beam. Make transfer of shear through construction joint by use of inclined reinforcement.

Provide keyways at least 1-1/2-inches deep in construction joints in walls and slabs and between walls and footings; approved bulkheads may be used for slabs.

3.10.2 Isolation Joints in Slabs on Ground

Provide joints at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

Fill joints with premolded joint filler strips 1/2 inch thick, extending full slab depth. Install filler strips at proper level below finish floor elevation with a slightly tapered, dress-and-oiled wood strip temporarily

secured to top of filler strip to form a groove not less than 3/4 inch in depth where joint is sealed with sealing compound and not less than 1/4 inch in depth where joint sealing is not required. Remove wood strip after concrete has set. Contractor must clean groove of foreign matter and loose particles after surface has dried.

3.10.3 Contraction Joints in Slabs on Ground

Provide joints to form panels as indicated.

Under and on exact line of each control joint, cut 50 percent of welded wire reinforcement before placing concrete.

Sawcut contraction joints into slab on ground in accordance with ACI 301 Section 5.

3.10.4 Sealing Joints in Slabs on Ground

Contraction and control joints which are to receive finish flooring material must be sealed with joint sealing compound after concrete curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.

Sealed groove must be left ready to receive filling material that is provided as part of finish floor covering work.

3.11 CURING AND PROTECTION

ACI 301 Section 5, unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer-hardener or epoxy coating. Allow curing compound/sealer installations to cure prior to the installation of materials that adsorb VOCs.

3.11.1 Curing Periods

ACI 301 Section 5, except 10 days for retaining walls, pavement or chimneys. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the Contracting Officer.

3.11.2 Curing Formed Surfaces

Accomplish curing of formed surfaces, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

3.11.3 Curing Unformed Surfaces

Accomplish initial curing of unformed surfaces, such as monolithic slabs, floor topping, and other flat surfaces, by membrane curing.

Unless otherwise specified, accomplish final curing of unformed surfaces by any of curing methods specified, as applicable.

Accomplish final curing of concrete surfaces to receive liquid floor hardener of finish flooring by moisture-retaining cover curing.

3.11.4 Temperature of Concrete During Curing

When temperature of atmosphere is 41 degrees F and below, maintain temperature of concrete at not less than 55 degrees F throughout concrete curing period or 45 degrees F when the curing period is measured by maturity. When necessary, make arrangements before start of concrete placing for heating, covering, insulation, or housing as required to maintain specified temperature and moisture conditions for concrete during curing period.

When the temperature of atmosphere is 80 degrees F and above or during other climatic conditions which cause too rapid drying of concrete, make arrangements before start of concrete placing for installation of wind breaks, of shading, and for fog spraying, wet sprinkling, or moisture-retaining covering of light color as required to protect concrete during curing period.

Changes in temperature of concrete must be uniform and not exceed 37 degrees F in any 1 hour nor 80 degrees F in any 24-hour period.

3.11.5 Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

3.11.6 Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

3.12 FIELD QUALITY CONTROL

3.12.1 Sampling

ASTM C172/C172M. Collect samples of fresh concrete to perform tests specified. ASTM C31/C31M for making test specimens.

3.12.2 Testing

3.12.2.1 Slump Tests

ASTM C143/C143M. Take concrete samples during concrete placement/discharge. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cementitious material ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

3.12.2.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.12.2.3 Compressive Strength Tests

ASTM C39/C39M. Make six 6 inch by 12 inch test cylinders for each set of tests in accordance with ASTM C31/C31M, ASTM C172/C172M and applicable requirements of ACI 305R and ACI 306R. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold two cylinder in reserve. Take samples for strength tests of each structural element and for concrete placed each day not less than once a day, nor less than once for each 100 cubic yards of concrete for the first 500 cubic yards, then every 500 cubic yards thereafter, nor less than once for each 5400 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days. Concrete compressive tests must meet the requirements of ACI 318 Section 5.6. Retest locations represented by erratic core strengths. Where retest does not meet concrete compressive strength requirements submit a mitigation or remediation plan for review and approval by the contracting officer. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

3.12.2.4 Air Content

ASTM C173/C173M or ASTM C231/C231M for normal weight concrete and ASTM C173/C173M for lightweight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

3.12.2.5 Unit Weight of Structural Concrete

ASTM C567/C567M and ASTM C138/C138M. Determine unit weight of lightweight and normal weight concrete. Perform test for every 20 cubic yards maximum.

3.12.2.6 Strength of Concrete Structure

The strength of the concrete structure will be considered to be deficient if any of the following conditions are identified:

Failure to meet compressive strength tests as evaluated

Reinforcement not conforming to requirements specified

Concrete which differs from required dimensions or location in such a manner as to reduce strength

Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to requirements specified

Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration

Poor workmanship likely to result in deficient strength

Where the strength of the concrete structure is considered deficient submit a mitigation or remediation plan for review and approval by the contracting officer.

3.12.2.7 Non-Conforming Materials

Factors that indicate that there are non-conforming materials include (but not limited to) excessive compressive strength, inadequate compressive strength, excessive slump, excessive voids and honeycombing, concrete delivery records that indicate excessive time between mixing and placement, or excessive water was added to the mixture during delivery and placement. Any of these indicators alone are sufficient reason for the Contracting Officer to request additional sampling and testing.

Investigations into non-conforming materials must be conducted at the Contractor's expense. The Contractor must be responsible for the investigation and must make written recommendations to adequately mitigate or remediate the non-conforming material. The Contracting Officer may accept, accept with reduced payment, require mitigation, or require removal and replacement of non-conforming material at no additional cost to the Government.

3.12.2.8 Testing Concrete Structure for Strength

When there is evidence that strength of concrete structure in place does not meet specification requirements or there are non-conforming materials, make cores drilled from hardened concrete for compressive strength determination in accordance with ASTM C42/C42M, and as follows:

Take at least three representative cores from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by the Contracting Officer.

Test cores after moisture conditioning in accordance with ASTM C42/C42M if concrete they represent is more than superficially wet under service.

Air dry cores, (60 to 80 degrees F with relative humidity less than 60 percent) for 7 days before test and test dry if concrete they represent is dry under service conditions.

Strength of cores from each member or area are considered satisfactory if their average is equal to or greater than 85 percent of the 28-day design compressive strength of the class of concrete.

Fill core holes solid with patching mortar and finished to match adjacent concrete surfaces.

Correct concrete work that is found inadequate by core tests in a manner approved by the Contracting Officer.

3.13 REPAIR, REHABILITATION AND REMOVAL

Before the Contracting Officer accepts the structure the Contractor must inspect the structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. A report documenting these defects must be prepared which includes recommendations for repair, removal or remediation must be submitted to the Contracting Officer for approval before any corrective work is accomplished.

3.13.1 Crack Repair

Prior to final acceptance, all cracks in excess of 0.02 inches wide must be documented and repaired. The proposed method and materials to repair the cracks must be submitted to the Contracting Officer for approval. The proposal must address the amount of movement expected in the crack due to temperature changes and loading.

3.13.2 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Concrete surfaces with weak surfaces less than 1/4 inch thick must be diamond ground to remove the weak surface. Surfaces containing weak surfaces greater than 1/4 inch thick must be removed and replaced or mitigated in a manner acceptable to the Contracting Officer.

3.13.3 Failure of Quality Assurance Test Results

Proposed mitigation efforts by the Contractor must be approved by the Contracting Officer prior to proceeding.

-- End of Section --

SECTION 04 20 00

MASONRY
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 CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 318	(2011; Errata 1 2011; Errata 2 2012; Errata 3-4 2013) Building Code Requirements for Structural Concrete and Commentary
ACI 530/530.1	(2013) Building Code Requirements and Specification for Masonry Structures and Related Commentaries

ASTM INTERNATIONAL (ASTM)

ASTM A1064/A1064M	(2013) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A167	(1999; R 2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A615/A615M	(2014) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A641/A641M	(2009a) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM B370	(2012) Standard Specification for Copper Sheet and Strip for Building Construction
ASTM B633	(2013) Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C1019	(2013) Standard Test Method for Sampling and Testing Grout

ASTM C1072	(2013; E 2014) Standard Test Method for Measurement of Masonry Flexural Bond Strength
ASTM C1142	(1995; R 2013) Standard Specification for Extended Life Mortar for Unit Masonry
ASTM C144	(2011) Standard Specification for Aggregate for Masonry Mortar
ASTM C150/C150M	(2012) Standard Specification for Portland Cement
ASTM C207	(2006; R 2011) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C270	(2012a) Standard Specification for Mortar for Unit Masonry
ASTM C476	(2010) Standard Specification for Grout for Masonry
ASTM C494/C494M	(2013) Standard Specification for Chemical Admixtures for Concrete
ASTM C641	(2009) Staining Materials in Lightweight Concrete Aggregates
ASTM C67	(2013a) Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
ASTM C780	(2014) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C90	(2014) Loadbearing Concrete Masonry Units
ASTM C91/C91M	(2012) Standard Specification for Masonry Cement
ASTM C94/C94M	(2014) Standard Specification for Ready-Mixed Concrete
ASTM C989/C989M	(2013) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D7611/D7611M	(2013) Standard Practice for Coding Plastic Manufactured Articles for Resin Identification
ASTM E514/E514M	(2014) Standard Test Method for Water Penetration and Leakage Through Masonry

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2012) International Building Code

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-04 (2013) Seismic Design for Buildings

1.2 SYSTEM DESCRIPTION

1.2.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. Masonry materials may be locally available. Submit documentation indicating distance between manufacturing facility and the project site, and distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in the project.

1.2.2 Environmental Data

Submit manufacturer's descriptive data. Documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

1.2.3 Plastic Identification

Verify that plastic products to be incorporated into the project are labeled in accordance with ASTM D7611/D7611M. Where products are not labeled, submit product data indicating polymeric information in the Operation and Maintenance Manual.

Type	
1	Polyethylene Terephthalate (PET, PETE)
2	High Density Polyethylene (HDPE)
3	Vinyl (Polyvinyl Chloride or PVC)
4	Low Density Polyethylene (LDPE)
5	Polypropylene (PP)
6	Polystyrene (PS)
7.	Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

1.2.4 Design Requirements

1.2.4.1 Unit Strength Method

Compute compressive strength of masonry system "Unit Strength Method", ACI 530/530.1. Submit calculations and certifications of unit and mortar strength.

1.2.4.2 Seismic Requirement

In addition to design requirements of ICC IBC, provide additional seismic reinforcement in accordance with UFC 3-310-04 The total minimum reinforcing percentage for structural walls shall be 0.20 percent and non-structural walls shall be 0.15 percent. The maximum spacing of reinforcing bars shall be as follows:

Wall Type	Vertical	Horizontal
Structural	24 inches	48 inches
Non-structural	48 inches	80 inches

Bond beams are required at the top of footings, at the bottom and top of openings at roof and floor levels, and at the top of parapet walls.

1.2.4.3 Masonry Strength

Determine masonry strength in accordance with ACI 530/530.1; submit test reports on three prisms as specified in ACI 530/530.1. The cost of testing shall be paid by the Contractor.

1.2.5 Additional Requirements

a. Maintain at least one spare vibrator on site at all times.

b. Provide bracing and scaffolding necessary for masonry work. Design bracing to resist wind pressure as required by local code.

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. 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

SD-03 Product Data

Local/Regional Materials
Environmental Data
Cement; G
Insulation; G
Cold Weather Installation; G
Water-Repellant Admixture; G

SD-04 Samples

Concrete Masonry Units (CMU); G
Anchors, Ties, and Bar Positioners; G
Joint Reinforcement; G
Insulation; G
Portable Panel; G

SD-05 Design Data

Pre-mixed Mortar; G
Unit Strength Method; G

SD-06 Test Reports

Efflorescence Test; G
Field Testing of Mortar; G
Field Testing of Grout; G
Prism tests; G
Masonry Cement; G
Single-Wythe Masonry Wall Water Penetration Test

SD-07 Certificates

Concrete Masonry Units (CMU)
Anchors, Ties, and Bar PositionersExpansion-Joint Materials
Joint Reinforcement
Masonry Cement
InsulationPrecast Concrete Items
Admixtures for Masonry Mortar
Admixtures for Grout
Insulation

SD-08 Manufacturer's Instructions

Masonry Cement

SD-10 Operation and Maintenance Data

Plastic Identification
Take-Back Program

1.4 QUALITY ASSURANCE

1.4.1 Sample Masonry Panels

After material samples are approved and prior to starting masonry work, construct a portable panel for each type and color of masonry required. At least 48 hours prior to constructing the sample panel or panels, submit written notification to the Contracting Officer. Sample panels shall not be built in, or as part of the structure, but shall be located where directed.

1.4.1.1 Configuration

Panels shall be L-shaped or otherwise configured to represent all of the wall elements. Panels shall be of the size necessary to demonstrate the acceptable level of workmanship for each type of masonry represented on the project. The minimum size of a straight panel or a leg of an L-shaped panel shall be 4 feet long by 4 feet high.

1.4.1.2 Composition

Panels shall show full color range, texture, and bond pattern of the masonry work. The Contractor's method for mortar joint tooling; grouting of reinforced vertical cores, collar joints, bond beams, and lintels; positioning, securing, and lapping of reinforcing steel; positioning and lapping of joint reinforcement (including prefabricated corners); and cleaning of masonry work shall be demonstrated during the construction of

the panels. Installation or application procedures for anchors, wall ties, CMU control joints, insulation, flashing, shall be shown in the sample panels. The panels shall contain a masonry bonded cornerthat includes a bond beam corner. Panels shall show installation of electrical boxes and conduit.

1.4.1.3 Usage

The completed panels shall be used as the standard of workmanship for the type of masonry represented. Masonry work shall not commence until the sample panel for that type of masonry construction has been completed and approved. Panels shall be protected from the weather and construction operations until the masonry work has been completed and approved. After completion of the work, the sample panels, including all foundation concrete, shall become the property of the Contractor and shall be removed from the construction site.

1.5 DELIVERY, STORAGE, AND HANDLING

Materials shall be delivered, stored, handled, and protected to avoid chipping, breakage, and contact with soil or contaminating material. Store and prepare materials in already disturbed areas to minimize project site disturbance and size of project site.

1.5.1 Masonry Units

Cover and protect moisture-controlled concrete masonry units and cementitious materials from precipitation. Conform to all handling and storage requirements of ASTM C90. Mark prefabricated lintels on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

1.5.2 Reinforcement, Anchors, and Ties

Steel reinforcing bars, coated anchors, ties, and joint reinforcement shall be stored above the ground. Steel reinforcing bars and uncoated ties shall be free of loose mill scale and rust.

1.5.3 Cementitious Materials, Sand and Aggregates

Cementitious and other packaged materials shall be delivered in unopened containers, plainly marked and labeled with manufacturers' names and brands. Cementitious material shall be stored in dry, weathertight enclosures or be completely covered. Cement shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Store sand and aggregates in a manner to prevent contamination or segregation.

1.6 PROJECT/SITE CONDITIONS

Conform to ACI 530/530.1 for hot and cold weather masonry erection.

1.6.1 Hot Weather Installation

Take the following precautions if masonry is erected when the ambient air temperature is more than 99 degrees F in the shade and the relative humidity is less than 50 percent or the ambient air temperature exceeds 90 degrees F and the wind velocity is more than 8 mph. All masonry materials shall be shaded from direct sunlight; mortar beds shall be spread no more

than 4 feet ahead of masonry; masonry units shall be set within one minute of spreading mortar; and after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

1.6.2 Cold Weather Installation

Before erecting masonry when ambient temperature or mean daily air temperature falls below 40 degrees F or temperature of masonry units is below 40 degrees F, submit a written statement of proposed cold weather construction procedures for approval.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

The source of materials which will affect the appearance of the finished work shall not be changed after the work has started except with Contracting Officer's approval. Submit sample of colored mortar with applicable masonry unit and color samples of three stretcher units and one unit for each type of special shape. Units shall show the full range of color and texture. Submit test reports from an approved independent laboratory. Test reports on a previously tested material shall be certified as the same as that proposed for use in this project. Submit certificates of compliance stating that the materials meet the specified requirements.

2.2 CONCRETE MASONRY UNITS (CMU)

Submit samples and certificates as specified. Cement shall have a low alkali content and be of one brand. Units shall contain a minimum of 10 percent post-consumer recycled content, or a minimum of 40 percent post-industrial recycled content. Units may contain post-consumer or post-industrial recycled content. Units shall be of modular dimensions and air, water, or steam cured. Exterior concrete masonry units shall have water-repellant admixture added during manufacture.

a. Hollow Load-Bearing Units: ASTM C90, made with normal weight aggregate. Provide load-bearing units for exterior walls.

2.2.1 Aggregates

Lightweight aggregates and blends of lightweight and heavier aggregates in proportions used in producing the units, shall comply with the following requirements when tested for stain-producing iron compounds in accordance with ASTM C641: by visual classification method, the iron stain deposited on the filter paper shall not exceed the "light stain" classification. Use industrial waste by-products (air-cooled slag, cinders, or bottom ash), ground waste glass and concrete, granulated slag, and expanded slag in aggregates. Slag shall comply with ASTM C989/C989M; Grade 80.

2.2.2 Kinds and Shapes

Units shall be modular in size and shall include closer, jamb, header, lintel, and bond beam units and special shapes and sizes to complete the work as indicated. In exposed interior masonry surfaces, units having a bullnose shall be used for vertical external corners except at door, window, and louver jambs. Radius of the bullnose shall be 1 inch. Units used in exposed masonry surfaces in any one building shall have a uniform fine to medium texture and a uniform color.

2.2.2.1 Architectural Units

Units shall have patterned face shell. Face shell pattern shall be split face. Units shall be integrally colored and have water repellant added during manufacture. Color shall be selected by the Contracting Officer. Exterior veneer shall be split face masonry units. Patterned face shell shall be properly aligned in the completed wall.

2.3 PRECAST CONCRETE ITEMS

Splashblocks and door sills shall be factory-made units from a plant regularly engaged in producing precast concrete units. Unless otherwise indicated, concrete shall be 4,000 psi minimum conforming to Section 03 30 00 CAST-IN-PLACE CONCRETE using 1/2 inch to No. 4 nominal-size coarse aggregate, and minimum reinforcement shall be the reinforcement required for handling of the units. Clearance of 3/4 inch shall be maintained between reinforcement and faces of units. Unless precast-concrete items have been subjected during manufacture to saturated-steam pressure of at least 120 psi for at least 5 hours, the items, after casting, shall be either damp-cured for 24 hours or steam-cured and shall then be aged under cover for 28 days or longer. Cast-concrete members weighing over 80 pounds shall have built-in loops of galvanized wire or other approved provisions for lifting and anchoring. Units shall have beds and joints at right angles to the face, with sharp true arises and shall be cast with drip grooves on the underside where units overhang walls. Exposed-to-view surfaces shall be free of surface voids, spalls, cracks, and chipped or broken edges. Precast units exposed-to-view shall be of uniform appearance and color. Unless otherwise specified, units shall have a smooth dense finish. Prior to use, each item shall be wetted and inspected for crazing. Items showing evidence of dusting, spalling, crazing, or having surfaces treated with a protective coating will be rejected. Submit specified factory certificates.

2.3.1 Lintels

Precast lintels, unless otherwise shown, shall be of a thickness equal to the wall and reinforced with two No. 4 bars for the full length. Top of lintels shall be labeled "TOP" or otherwise identified and each lintel shall be clearly marked to show location in the structure. In reinforced masonry, lintels shall conform to ACI 318 for flexural and shear strength and shall have at least 8 inches bearing at each end. Concrete shall have a minimum 28 day compressive strength of 4,000 psi using 1/2 inch to No. 4 nominal-size coarse aggregate. Reinforcement shall conform to ASTM A615/A615M Grade 60,000 psi. Limit lintel deflection due to dead plus live load to L/600 or 0.3 inches. Provide top and bottom bars for lintels over 36 inches in length.

2.3.2 Splash Blocks

Splash blocks shall be as detailed. Reinforcement shall be the manufacturer's standard.

2.4 MASONRY MORTAR

Type M mortar shall conform to ASTM C270 and shall be used for foundation walls. Mortar Type S shall conform to the proportion specification of ASTM C270 except Type S cement-lime mortar proportions shall be 1 part cement, 1/2 part lime and 4-1/2 parts aggregate; Type S mortar shall be

used for all masonry work; except where higher compressive strength is indicated on structural drawings. When masonry cement ASTM C91/C91M is used the maximum air content shall be limited to 12 percent and performance equal to cement-lime mortar shall be verified. Verification of masonry cement performance shall be based on ASTM C780 and ASTM C1072. Cement shall have a low alkali content and be of one brand. Aggregates shall be from one source.

2.4.1 Admixtures for Masonry Mortar

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C494/C494M, Type C. Submit the required certifications.

2.4.2 Colored Mortar

Mortar coloring shall be added to the mortar used for exposed masonry surfaces to produce a uniform color matching existing facility masonry. Mortar coloring shall be chemically inert, of finely ground limeproof pigment, and furnished in accurately pre-measured and packaged units that can be added to a measured amount of cement.

2.4.3 Hydrated Lime and Alternates

Hydrated lime shall conform to ASTM C207, Type S.

2.4.4 Cement

Portland cement shall conform to ASTM C150/C150M, Type I. Masonry cement shall conform to ASTM C91/C91M, Type S. Containers shall bear complete instructions for proportioning and mixing to obtain the required types of mortar. Incorporate to the maximum extent, without conflicting with other requirements of this section, up to 40 percent fly ash, up to 70 percent slag, up to 10 percent cenospheres, and up to 10 percent silica fume. When masonry cement is used, submit the manufacturer's printed instructions on proportions of water and aggregates and on mixing to obtain the type of mortar required. Additives shall conform to requirements in Section 03 30 00 CAST-IN-PLACE CONCRETE.

2.4.5 Pre-Mixed Mortar

Pre-mixed mortar shall conform to ASTM C1142, Type RS. Submit pre-mixed mortar composition.

2.4.6 Sand and Water

Sand shall conform to ASTM C144. Water shall be clean, potable, and free from substances which could adversely affect the mortar.

2.5 WATER-REPELLANT ADMIXTURE

Polymeric type formulated to reduce porosity and water penetration and water absorption of the mortar and masonry units required to provide for the exterior single-wythe masonry wall water penetration resistance indicated in Paragraph SINGLE-WYTHE MASONRY WALL WATER PENETRATION TEST.

2.6 GROUT AND READY-MIXED GROUT

Grout shall conform to ASTM C476, fine. Cement used in grout shall have a low alkali content. Grout slump shall be between 8 and 10 inches. Minimum grout strength shall be 2000 psi in 28 days, as tested by ASTM C1019. Use grout subject to the limitations of Table III. Do not change proportions and do not use materials with different physical or chemical characteristics in grout for the work unless additional evidence is furnished that the grout meets the specified requirements. Ready-Mixed grout shall conform to ASTM C94/C94M.

2.6.1 Admixtures for Grout

In cold weather, a non-chloride based accelerating admixture may be used subject to approval; accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C494/C494M, Type C. In general, air-entrainment, anti-freeze or chloride admixtures shall not be used except as approved by the Contracting Officer. Submit required certifications.

2.6.2 Grout Barriers

Grout barriers for vertical cores shall consist of fine mesh wire, fiberglass, or expanded metal.

2.7 ANCHORS, TIES, AND BAR POSITIONERS

Anchors and ties shall be fabricated without drips or crimps and shall be zinc-coated in accordance with ASTM A153/A153M, Class B-2. Steel wire used for anchors and ties shall be fabricated from steel wire conforming to ASTM A1064/A1064M. Wire ties or anchors in exterior walls shall conform to ASTM A641/A641M. Joint reinforcement in interior walls, and in exterior or interior walls exposed to moist environment shall conform to ASTM A641/A641M; coordinate with paragraph JOINT REINFORCEMENT below. Anchors and ties shall be sized to provide a minimum of 5/8 inch mortar cover from either face. Submit two anchors, ties and bar positioners of each type used, as samples.

2.7.1 Wire Mesh Ties

Wire mesh for tying 4 inch thick concrete masonry unit partitions to other intersecting masonry partitions shall be 1/2 inch mesh of minimum 16 gauge steel wire. Minimum lengths shall be not less than 12 inches.

2.7.2 Bar Positioners

Bar positioners, used to prevent displacement of reinforcing bars during the course of construction, shall be factory fabricated from 9 gauge steel wire or equivalent, and coated with a hot-dip galvanized finish. Not more than one wire shall cross the cell. Telescoping bar positioner shall be manufactured from AISI 1065 spring steel and coated in accordance with ASTM B633.

2.8 JOINT REINFORCEMENT

Joint reinforcement shall be factory fabricated from steel wire conforming to ASTM A1064/A1064M, welded construction. Tack welding will not be acceptable in reinforcement used for wall ties. Wire shall have zinc coating conforming to ASTM A153/A153M, Class B-2. All wires shall be a

minimum of 9 gauge. Reinforcement shall be ladder type design, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units. Joint reinforcement shall be placed a minimum of 5/8 inch cover from either face. The distance between crosswires shall not exceed 16 inches. Joint reinforcement for straight runs shall be furnished in flat sections not less than 10 feet long. Joint reinforcement shall be provided with factory formed corners and intersections. If approved for use, joint reinforcement may be furnished with adjustable wall tie features. Submit one piece of each type used, including corner and wall intersection pieces, showing at least two cross wires.

2.9 REINFORCING STEEL BARS AND RODS

Reinforcing steel bars and rods shall conform to ASTM A615/A615M, Grade 60.

2.10 RIGID BOARD-TYPE INSULATION

Provide rigid board-type insulation as specified in Section 07 21 13 BOARD AND BLOCK INSULATION. Submit one piece of each type used, including corner and wall intersection pieces, showing at least two cross wires. Submit certificate attesting that the polyurethane or polyisocyanurate insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

2.11 EXPANSION-JOINT MATERIALS

Backer rod and sealant shall be adequate to accommodate joint compression equal to 50 percent of the width of the joint. The backer rod shall be compressible rod stock of polyethylene foam, polyurethane foam, butyl rubber foam, or other flexible, nonabsorptive material as recommended by the sealant manufacturer. Sealant shall conform to Section 07 92 00 JOINT SEALANTS, and shall be penetrating with a maximum volatile organic compound (VOC) content of 600 grams/liter. Submit one piece of each type of material used.

2.12 THROUGH WALL FLASHING

Provide Through Wall Flashing as specified in Section 07 60 00 FLASHING AND SHEET METAL. Provide one of the following types

2.12.1 Coated-Copper Flashing

7 ounce, electrolytic copper sheet, uniformly coated on both sides with acidproof, alkaliproof, elastic bituminous compound. Factory apply coating to a weight of not less than 6 ounces/square foot (approximately 3 ounces/square foot on each side).

2.12.2 Copper or Stainless Steel Flashing

Copper, ASTM B370, minimum 16 ounce weight; stainless steel, ASTM A167, Type 301, 302, 304, or 316, 0.015 inch thick, No. 2D finish. Provide with factory-fabricated deformations that mechanically bond flashing against horizontal movement in all directions. Deformations shall consist of dimples, diagonal corrugations, or a combination of dimples and transverse corrugations.

2.12.3 Reinforced Membrane Flashing

Polyester film core with a reinforcing fiberglass scrim bonded to one

side. The membrane shall be impervious to moisture, flexible, and not affected by caustic alkalis. The material, after being exposed for not less than 1/2 hour to a temperature of 32 degrees F, shall show no cracking when, at that temperature, it is bent 180 degrees over a 1/16 inch diameter mandrel and then bent at the same point over the same size mandrel in the opposite direction 360 degrees.

2.13 WEEP HOLE VENTILATORS

Weep hole ventilators shall be prefabricated aluminum, plastic or wood blocking sized to form the proper size opening in head joints. Provide aluminum and plastic inserts with grill or screen-type openings designed to allow the passage of moisture from cavities and to prevent the entrance or insects. Ventilators shall be sized to match modular construction with a standard 3/8 inch mortar joint.

PART 3 EXECUTION

3.1 PREPARATION

Prior to start of work, masonry inspector shall verify the applicable conditions as set forth in ACI 530/530.1, inspection. The Contracting Officer will serve as inspector or will select a masonry inspector.

3.1.1 Protection

Ice or snow formed on the masonry bed shall be thawed by the application of heat. Heat shall be applied carefully until the top surface of the masonry is dry to the touch. Sections of masonry deemed frozen and damaged shall be removed before continuing construction of those sections.

3.1.1.1 Air Temperature 40 to 32 Degrees F

Heat sand or mixing water to produce mortar temperatures between 40 and 120 degrees F

3.1.1.2 Air Temperature 32 to 25 Degrees F

Heat sand and mixing water to produce mortar temperatures between 40 and 120 degrees F. Maintain temperature of mortar on boards above freezing.

3.1.1.3 Air Temperature 25 to 20 Degrees F

Heat sand and mixing water to provide mortar temperatures between 40 and 120 degrees F. Maintain temperature of mortar on boards above freezing. Use sources of heat on both sides of walls under construction. Employ windbreaks when wind is in excess of 15 mph.

3.1.1.4 Air Temperature 20 Degrees F and Below

Heat sand and mixing water to provide mortar temperatures between 40 and 120 degrees F. Provide enclosure and auxiliary heat to maintain air temperature above 32 degrees F. Temperature of units when laid must not be less than 20 degrees F.

3.1.2 Completed Masonry and Masonry Not Being Worked On

3.1.2.1 Mean Daily Air Temperature 40 to 32 Degrees F

Protect masonry from rain or snow for 24 hours by covering with weather-resistive membrane.

3.1.2.2 Mean Daily Air Temperature 32 to 25 Degrees F

Completely cover masonry with weather-resistant membrane for 24 hours.

3.1.2.3 Mean Daily Air Temperature 25 to 20 Degrees F

Completey cover masonry with insulating blankets or equally protected for 24 hours.

3.1.2.4 Mean Daily Temperature 20 Degrees F and Below

Maintain masonry temperature above 32 degrees F for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps, or other approved methods.

3.1.3 Stains

Protect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.

3.1.4 Loads

Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

3.1.5 Surfaces

Clean surfaces on which masonry is to be placed of laitance, dust, dirt, oil, organic matter, or other foreign materials and slightly roughen to provide a surface texture with a depth of at least 1/8 inch. Sandblast, if necessary, to remove laitance from pores and to expose the aggregate.

3.2 LAYING MASONRY UNITS

a. Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Masonry units shall be laid in running bond pattern. Facing courses shall be level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances shall be plus or minus 1/2 inch. Each unit shall be adjusted to its final position while mortar is still soft and plastic.

b. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned, and relaid with fresh mortar. Air spaces, cavities, chases, expansion joints, and spaces to be grouted shall be kept free from mortar and other debris. Units used in exposed masonry surfaces shall be selected from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work. Vertical joints shall be kept plumb.

c. Units being laid and surfaces to receive units shall be free of water film and frost. Solid units shall be laid in a nonfurrowed full bed of mortar. Mortar for veneer wythes shall be beveled and sloped toward the center of the wythe from the cavity side. Units shall be shoved into place so that the vertical joints are tight. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control, expansion, and isolation joints, shall be completely filled with mortar. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below.

d. In double wythe construction, the inner wythe may be brought up not more than 16 inches ahead of the outer wythe. Collar joints shall be filled with mortar or grout during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe by more than 8 inches.

3.2.1 Forms and Shores

Provide bracing and scaffolding as required. Design bracing to resist wind pressure as required by local codes. Forms and shores shall be sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Supporting forms and shores shall not be removed in less than 10 days.

3.2.2 Reinforced Concrete Masonry Units Walls

Where vertical reinforcement occurs, fill cores solid with grout. Lay units in such a manner as to preserve the unobstructed vertical continuity of cores to be filled. Embed the adjacent webs in mortar to prevent leakage of grout. Remove mortar fins protruding from joints before placing grout. Minimum clear dimensions of vertical cores shall be 2 by 3 inches. Position reinforcing accurately as indicated before placing grout. As masonry work progresses, secure vertical reinforcing in place at vertical intervals not to exceed 160 bar diameters. Use puddling rod or vibrator to consolidate the grout. Minimum clear distance between masonry and vertical reinforcement shall be not less than 1/2 inch. Unless indicated or specified otherwise, form splices by lapping bars not less than 40 bar diameters and wire tying them together.

3.2.3 Concrete Masonry Units

Units in piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout shall be full bedded in mortar under both face shells and webs. Other units shall be full bedded under both face shells. Head joints shall be filled solidly with mortar for a distance in from the face of the unit not less than the thickness of the face shell. Foundation walls below grade shall be grouted solid. Jamb units shall be of the shapes and sizes to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved. Double walls shall be stiffened at wall-mounted plumbing fixtures by use of strap anchors, two above each fixture and two below each fixture, located to avoid pipe runs, and extending from center to center of the double wall. Walls and partitions shall be adequately reinforced for support of wall-hung plumbing fixtures when chair carriers are not specified.

3.2.4 Tolerances

Lay masonry plumb, true to line, with courses level. Keep bond pattern plumb throughout. Square corners unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, lay masonry within the following tolerances (plus or minus unless otherwise noted):

TABLE II TOLERANCES	
Variation from the plumb in the lines and surfaces of columns, walls and arises	
In adjacent masonry units	1/8 inch
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch
Variations from the plumb for external corners, expansion joints, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from the level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variation from level for bed joints and top surfaces of bearing walls	
In 10 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from horizontal lines	
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch
Variations in cross sectional dimensions of columns and in thickness of walls	
Minus	1/4 inch
Plus	1/2 inch

3.2.5 Cutting and Fitting

Full units of the proper size shall be used wherever possible, in lieu of

cut units. Cutting and fitting, including that required to accommodate the work of others, shall be done by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall. Cut edges shall be clean, true and sharp. Openings in the masonry shall be made carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Reinforced masonry lintels shall be provided above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

3.2.6 Jointing

Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as follows:

3.2.6.1 Flush Joints

Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas shall be flush cut. Flush cut joints shall be made by cutting off the mortar flush with the face of the wall. Joints in unparged masonry walls below grade shall be pointed tight. Flush joints for architectural units, such as fluted units, shall completely fill both the head and bed joints.

3.2.6.2 Tooled Joints

Joints in exposed exterior and interior masonry surfaces shall be tooled slightly concave. Joints shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.

3.2.6.3 Door and Window Frame Joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch.

3.2.7 Joint Widths

Joint widths shall be as follows:

3.2.7.1 Concrete Masonry Units

Concrete masonry units shall have 3/8 inch joints, except for prefaced concrete masonry units.

3.2.7.2 Prefaced Concrete Masonry Units

Prefaced concrete masonry units shall have a joint width of 3/8 inch wide on unfaced side and not less than 3/16 inch nor more than 1/4 inch wide on prefaced side.

3.2.7.3 Brick

Brick joint widths shall be the difference between the actual and nominal dimensions of the brick in either height or length. Brick expansion joint widths shall be as shown.

3.2.8 Embedded Items

Fill spaces around built-in items with mortar. Point openings around flush-mount electrical outlet boxes in wet locations with mortar. Embed anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in as the masonry work progresses. Fully embed anchors, ties and joint reinforcement in the mortar. Fill cells receiving anchor bolts and cells of the first course below bearing plates with grout.

3.2.9 Unfinished Work

Step back unfinished work for joining with new work. Toothing may be resorted to only when specifically approved. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

3.2.10 Masonry Wall Intersections

Masonry bond each course at corners and elsewhere as shown. Masonry walls shall be anchored or tied together at corners and intersections with bond beam reinforcement and prefabricated corner or tee pieces of joint reinforcement as shown.

3.2.11 Partitions

Partitions shall be continuous from floor to underside of floor or roof deck where shown. Openings in firewalls around joists or other structural members shall be filled as indicated or approved. Where suspended ceilings on both sides of partitions are indicated, the partitions other than those shown to be continuous may be stopped approximately 4 inches above the ceiling level. An isolation joint shall be placed in the intersection between partitions and structural or exterior walls as shown. Interior partitions having 4 inch nominal thick units shall be tied to intersecting partitions of 4 inch units, 5 inches into partitions of 6 inch units, and 7 inches into partitions of 8 inch or thicker units. Cells within vertical plane of ties shall be filled solid with grout for full height of partition or solid masonry units may be used. Interior partitions having masonry walls over 4 inches thick shall be tied together with joint reinforcement. Partitions containing joint reinforcement shall be provided with prefabricated pieces at corners and intersections or partitions.

3.3 COMPRESSED EARTH BLOCK

Install according to manufacturer instructions and accepted industry standards.

3.4 ANCHORED VENEER CONSTRUCTION

Completely separate the inner and outer wythes by a continuous airspace as indicated. Lay up both the inner and the outer wythes together except when adjustable joint reinforcement assemblies are approved for use. When both wythes are not brought up together, through-wall flashings shall be protected from damage until they are fully enclosed in the wall. The airspace between the wythes shall be kept clear and free of mortar

droppings by temporary wood strips laid on the wall ties and carefully lifted out before placing the next row of ties. A coarse gravel or drainage material shall be placed behind the weep holes in the cavity to a minimum depth of 4 inches of coarse aggregate or 10 inches of drainage material to keep mortar droppings from plugging the weep holes.

3.5 WEEP HOLES

Wherever through-wall flashing occurs, provide weep holes to drain flashing to exterior at acceptable locations as indicated on drawings. Weep holes shall be Weep holes shall be constructed using weep hole ventilators. Other approved methods may be used for providing weep holes. Weep holes shall be kept free of mortar and other obstructions.

3.6 MORTAR MIX

Mix mortar in a mechanically operated mortar mixer for at least 3 minutes, but not more than 5 minutes. Measure ingredients for mortar by volume. Ingredients not in containers, such as sand, shall be accurately measured by the use of measuring boxes. Mix water with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Retemper mortar that has stiffened because of loss of water through evaporation by adding water to restore the proper consistency and workability. Discard mortar that has reached its initial set or that has not been used within 2.5 hours after mixing.

3.7 REINFORCING STEEL

Clean reinforcement of loose, flaky rust, scale, grease, mortar, grout, or other coating which might destroy or reduce its bond prior to placing grout. Bars with kinks or bends not shown on the drawings shall not be used. Reinforcement shall be placed prior to grouting. Unless otherwise indicated, vertical wall reinforcement shall extend to within 2 inches of tops of walls.

3.7.1 Positioning Bars

Vertical bars shall be accurately placed within the cells at the positions indicated on the drawings. A minimum clearance of 1/2 inch shall be maintained between the bars and masonry units. Minimum clearance between parallel bars shall be one diameter of the reinforcement. Vertical reinforcing may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement. Column and pilaster ties shall be wired in position around the vertical steel. Ties shall be in contact with the vertical reinforcement and shall not be placed in horizontal bed joints.

3.7.2 Splices

Bars shall be lapped a minimum of 48 diameters of the reinforcement. Welded or mechanical connections shall develop at least 125 percent of the specified yield strength of the reinforcement.

3.8 JOINT REINFORCEMENT INSTALLATION

Install joint reinforcement at 16 inches on center or as indicated. Reinforcement shall be lapped not less than 6 inches. Install prefabricated sections at corners and wall intersections. Place the longitudinal wires of joint reinforcement to provide not less than 5/8 inch

cover to either face of the unit.

3.9 PLACING GROUT

Fill cells containing reinforcing bars with grout. Hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, voids at door and window jambs, and other indicated spaces shall be filled solid with grout. Cells under lintel bearings on each side of openings shall be filled solid with grout for full height of openings. Walls below grade, lintels, and bond beams shall be filled solid with grout. Units other than open end units may require grouting each course to preclude voids in the units. Grout not in place within 1-1/2 hours after water is first added to the batch shall be discarded. Sufficient time shall be allowed between grout lifts to preclude displacement or cracking of face shells of masonry units. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, the wall shall be torn down and rebuilt.

3.9.1 Vertical Grout Barriers for Fully Grouted Walls

Provide grout barriers not more than 30 feet apart, or as required, to limit the horizontal flow of grout for each pour.

3.9.2 Horizontal Grout Barriers

Embed grout barriers in mortar below cells of hollow units receiving grout.

3.9.3 Grout Holes and Cleanouts

3.9.3.1 Grout Holes

Provide grouting holes in slabs, spandrel beams, and other in-place overhead construction. Locate holes over vertical reinforcing bars or as required to facilitate grout fill in bond beams. Provide additional openings spaced not more than 16 inches on centers where grouting of all hollow unit masonry is indicated. Openings shall not be less than 4 inches in diameter or 3 by 4 inches in horizontal dimensions. Upon completion of grouting operations, plug and finish grouting holes to match surrounding surfaces.

3.9.3.2 Cleanouts for Hollow Unit Masonry Construction

Provide cleanout holes at the bottom of every pour in cores containing vertical reinforcement when the height of the grout pour exceeds 5 feet. Where all cells are to be grouted, construct cleanout courses using bond beam units in an inverted position to permit cleaning of all cells. Provide cleanout holes at a maximum spacing of 32 inches where all cells are to be filled with grout. Establish a new series of cleanouts if grouting operations are stopped for more than 4 hours. Cleanouts shall not be less than 3 by 4 inch openings cut from one face shell. Manufacturer's standard cutout units may be used at the Contractor's option. Cleanout holes shall not be closed until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, close cleanout holes in an approved manner to match surrounding masonry.

3.9.3.3 Cleanouts for Solid Unit Masonry Construction

Provide cleanouts for construction of walls consisting of a grout filled

cavity between solid masonry wythes at the bottom of every pour by omitting every other masonry unit from one wythe. Establish a new series of cleanouts if grouting operations are stopped for more than 4 hours. Do not plug cleanout holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, close cleanout holes in an approved manner to match surrounding masonry.

3.9.4 Grouting Equipment

3.9.4.1 Grout Pumps

Pumping through aluminum tubes will not be permitted. Operate pumps to produce a continuous stream of grout without air pockets, segregation, or contamination. Upon completion of each day's pumping, remove waste materials and debris from the equipment, and dispose of outside the masonry.

3.9.4.2 Vibrators

Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the grout. Maintain at least one spare vibrator at the site at all times. Apply vibrators at uniformly spaced points not further apart than the visible effectiveness of the machine. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation.

3.9.5 Grout Placement

Lay masonry to the top of a pour before placing grout. Do no place grout in two-wythe solid unit masonry cavity until mortar joints have set for at least 3 days during hot weather and 5 days during cold damp weather. Grout shall not be placed in hollow unit masonry until mortar joints have set for at least 24 hours. Grout shall be placed using a hand bucket, concrete hopper, or grout pump to completely fill the grout spaces without segregation of the aggregates. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. The height of grout pours and type of grout used shall be limited by the dimensions of grout spaces as indicated in Table III. Low-lift grout methods may be used on pours up to and including 5 feet in height. High-lift grout methods shall be used on pours exceeding 5 feet in height.

3.9.5.1 Low-Lift Method

Grout shall be placed at a rate that will not cause displacement of the masonry due to hydrostatic pressure of the grout. Mortar protruding more than 1/2 inch into the grout space shall be removed before beginning the grouting operation. Grout pours 12 inches or less in height shall be consolidated by mechanical vibration or by puddling. Grout pours over 12 inches in height shall be consolidated by mechanical vibration and reconsolidated by mechanical vibration after initial water loss and settlement has occurred. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. Low-lift grout shall be used subject to the limitations of Table III.

3.9.5.2 High-Lift Method

Mortar droppings shall be cleaned from the bottom of the grout space and from reinforcing steel. Mortar protruding more than 1/4 inch into the grout space shall be removed by dislodging the projections with a rod or

stick as the work progresses. Reinforcing, bolts, and embedded connections shall be rigidly held in position before grouting is started. CMU units shall not be pre-wetted. Grout, from the mixer to the point of deposit in the grout space shall be placed as rapidly as practical by pumping and placing methods which will prevent segregation of the mix and cause a minimum of grout splatter on reinforcing and masonry surfaces not being immediately encased in the grout lift. The individual lifts of grout shall be limited to 4 feet in height. The first lift of grout shall be placed to a uniform height within the pour section and vibrated thoroughly to fill all voids. This first vibration shall follow immediately behind the pouring of the grout using an approved mechanical vibrator. After a waiting period sufficient to permit the grout to become plastic, but before it has taken any set, the succeeding lift shall be poured and vibrated 12 to 18 inches into the preceding lift. If the placing of the succeeding lift is going to be delayed beyond the period of workability of the preceding, each lift shall be reconsolidated by reworking with a second vibrator as soon as the grout has taken its settlement shrinkage. The waiting, pouring, and reconsolidation steps shall be repeated until the top of the pour is reached. The top lift shall be reconsolidated after the required waiting period. The high-lift grouting of any section of wall between vertical grout barriers shall be completed to the top of a pour in one working day unless a new series of cleanout holes is established and the resulting horizontal construction joint cleaned. High-lift grout shall be used subject to the limitations in Table III.

TABLE III
POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS

			Minimum Dimensions of the Total Clear Areas Within Grout Spaces and Cells in inches (1,2)	
Maximum Grout Pour Height feet (4)	Grout Type	Grouting Procedure	Multiwythe Masonry (3)	Hollow-unit Masonry
1	Fine	Low Lift	3/4	1-1/2 x 2
5	Fine	Low Lift	2	2 x 3
8	Fine	High Lift	2	2 x 3
12	Fine	High Lift	2-1/2	2-1/2 x 3
24	Fine	High Lift	3	3 x 3
1	Coarse	Low Lift	1-1/2	1-1/2 x 3
5	Coarse	Low Lift	2	2-1/2 x 3
8	Coarse	High Lift	2	3 x 3
12	Coarse	High Lift	2-1/2	3 x 3

TABLE III
POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS

			Minimum Dimensions of the Total Clear Areas Within Grout Spaces and Cells in inches (1,2)	
Maximum Grout Pour Height feet (4)	Grout Type	Grouting Procedure	Multiwythe Masonry (3)	Hollow-unit Masonry
24	Coarse	High Lift	3	3 x 4

Notes:

(1) The actual grout space or cell dimension shall be larger than the sum of the following items:

(a) The required minimum dimensions of total clear areas given in the table above;

(b) The width of any mortar projections within the space;

(c) The horizontal projections of the diameters of the horizontal reinforcing bars within a cross section of the grout space or cell.

(2) The minimum dimensions of the total clear areas shall be made up of one or more open areas, with at least one area being 3/4 inch or greater in width.

(3) For grouting spaces between masonry wythes.

(4) Where only cells of hollow masonry units containing reinforcement are grouted, the maximum height of the pour shall not exceed the distance between horizontal bond beams.

3.10 BOND BEAMS

Bond beams shall be filled with grout and reinforced as indicated on the drawings. Grout barriers shall be installed under bond beam units to retain the grout as required. Reinforcement shall be continuous, including around corners, except through control joints or expansion joints, unless otherwise indicated on the drawings. Where splices are required for continuity, reinforcement shall be lapped 48 bar diameters. A minimum clearance of 1/2 inch shall be maintained between reinforcement and interior faces of units.

3.11 CONTROL JOINTS

Control joints shall be provided as indicated and shall be constructed by using sash jamb units with control joint key. Sash jamb units shall have a 3/4 by 3/4 inch groove near the center at end of each unit. The vertical mortar joint at control joint locations shall be continuous, including through all bond beams. This shall be accomplished by utilizing half blocks in alternating courses on each side of the joint. The control joint key shall be interrupted in courses containing continuous bond beam steel. In single wythe exterior masonry walls, the exterior control joints shall be raked to a depth of 3/4 inch; backer rod and sealant shall be installed in accordance with Section 07 92 00 JOINT SEALANTS. Exposed interior control joints shall be raked to a depth of 1/4 inch. Concealed control

joints shall be flush cut.

3.12 INDICATED JOINTS

Concrete masonry veneer joints located, detailed, and constructed as indicated. Keep joints free of mortar and other debris.

3.13 SHELF ANGLES

Adjust shelf angles as required to keep the masonry level and at the proper elevation. Shelf angles shall be galvanized and provided in sections not longer than 10 feet and installed with a 1/4 inch gap between sections. Shelf angles shall be mitered and welded at building corners with each angle not shorter than 4 feet, unless limited by wall configuration.

3.14 LINTELS

3.14.1 Masonry Lintels

Construct masonry lintels with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 4 bars in the bottom course unless otherwise indicated on the drawings. Lintel reinforcement shall extend beyond each side of masonry opening 40 bar diameters or 24 inches, whichever is greater. Reinforcing bars shall be supported in place prior to grouting and shall be located 1/2 inch above the bottom inside surface of the lintel unit.

3.14.2 Precast Concrete and Steel Lintels

Construct precast concrete and steel lintels as shown on the drawings. Lintels shall be set in a full bed of mortar with faces plumb and true. Steel and precast lintels shall have a minimum bearing length of 8 inches unless otherwise indicated on the drawings.

3.15 SILLS AND COPINGS

Sills and copings shall be set in a full bed of mortar with faces plumb and true.

3.16 ANCHORAGE TO CONCRETE AND STRUCTURAL STEEL

3.16.1 Anchorage to Concrete

Anchorage of masonry to the face of concrete columns, beams, or walls shall be with dovetail anchors spaced not over 16 inches on centers vertically and 24 inches on center horizontally.

3.16.2 Anchorage to Structural Steel

Masonry shall be anchored to vertical structural steel framing with adjustable steel wire anchors spaced not over 16 inches on centers vertically, and if applicable, not over 24 inches on centers horizontally.

3.17 PARGING

The outside face of below-grade exterior concrete-masonry unit walls enclosing usable rooms and spaces, except crawl spaces, shall be parged with type S mortar. Parging shall not be less than 1/2 inch thick troweled to a smooth dense surface so as to provide a continuous unbroken shield

from top of footings to a line 6 inches below adjacent finish grade, unless otherwise indicated. Parging shall be coved at junction of wall and footing. Parging shall be damp-cured for 48 hours or more before backfilling. Parging shall be protected from freezing temperatures until hardened.

3.18 INSULATION

Anchored veneer walls shall be insulated, where shown, by installing board-type insulation on the cavity side of the inner wythe. Board type insulation shall be applied directly to the masonry or thru-wall flashing with adhesive. Insulation shall be neatly fitted between obstructions without impaling of insulation on ties or anchors. The insulation shall be applied in parallel courses with vertical joints breaking midway over the course below and shall be applied in moderate contact with adjoining units without forcing, and shall be cut to fit neatly against adjoining surfaces.

3.19 SPLASH BLOCKS

Locate splash blocks as indicated.

3.20 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, completely remove mortar and grout daubs or splashings from masonry-unit surfaces that will be exposed or painted. Before completion of the work, defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Immediately after grout work is completed, scum and stains which have percolated through the masonry work shall be removed using a high pressure stream of water and a stiff bristled brush. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Metal tools and metal brushes shall not be used for cleaning.

3.20.1 Dry-Brushing

a. Exposed concrete masonry unit

b. Exposed concrete brick surfaces

c. shall be dry-brushed at the end of each day's work and after any required pointing, using stiff-fiber bristled brushes.

3.20.2 Clay or Shale Brick Surfaces

Clean exposed clay or shale brick masonry surfaces as necessary to obtain surfaces free of stain, dirt, mortar and grout daubs, efflorescence, and discoloration or scum from cleaning operations. After cleaning, examine the sample panel of similar material for discoloration or stain as a result of cleaning. If the sample panel is discolored or stained, change the method of cleaning to ensure that the masonry surfaces in the structure will not be adversely affected. The exposed masonry surfaces shall be water-soaked and then cleaned with a solution proportioned 1/2 cup trisodium phosphate and 1/2 cup laundry detergent to one gallon of water or cleaned with a proprietary masonry cleaning agent specifically recommended

for the color and texture by the clay products manufacturer. The solution shall be applied with stiff fiber brushes, followed immediately by thorough rinsing with clean water. Proprietary cleaning agents shall be used in conformance with the cleaning product manufacturer's printed recommendations. Efflorescence shall be removed in conformance with the brick manufacturer's recommendations.

3.21 BEARING PLATES

Set bearing plates for beams, joists, joist girders and similar structural members to the proper line and elevation with damp-pack bedding mortar, except where non-shrink grout is indicated. Bedding mortar and non-shrink grout shall be as specified in Section 03 30 00 CAST-IN-PLACE CONCRETE.

3.22 PROTECTION

Protect facing materials against staining. Cover top of walls with nonstaining waterproof covering or membrane when work is not in progress. Covering of the top of the unfinished walls shall continue until the wall is waterproofed with a complete roof or parapet system. Covering shall extend a minimum of 2 feet down on each side of the wall and shall be held securely in place. Before starting or resuming, top surface of masonry in place shall be cleaned of loose mortar and foreign material.

3.23 WASTE MANAGEMENT

Manage waste according to the Waste Management Plan and as follows. Minimize water used to wash mixing equipment. Use trigger operated spray nozzles for water hoses.

3.23.1 Separate and Recycle Waste

Place materials defined as hazardous or toxic waste in designated containers. Fold up metal banding, flatten, and place in designated area for recycling. Collect wood packing shims and pallets and place in designated area. Separate masonry waste and place in designated area for use as structural fill. Separate selected masonry waste and excess for landscape uses, either whole or crushed as ground cover.

3.23.2 Take-Back Program

Collect information from manufacturer for take-back program options. Set aside masonry units, full and partial to be returned to manufacturer for recycling into new product. When such a service is not available, local recyclers shall be sought after to reclaim the materials. 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.

3.24 TEST REPORTS

3.24.1 Field Testing of Mortar

Take at least three specimens of mortar each day. Spread a layer of mortar 1/2 to 5/8 inch thick on the masonry units and allowed to stand for one minute. Prepare and test the specimens for compressive strength in accordance with ASTM C780. Submit test results.

3.24.2 Field Testing of Grout

Field sampling and testing of grout shall be in accordance with the applicable provisions of ASTM C1019. A minimum of three specimens of grout per day shall be sampled and tested. Each specimen shall have a minimum ultimate compressive strength of 2000 psi at 28 days. Submit test results.

3.24.3 Efflorescence Test

Test brick, which will be exposed to weathering, for efflorescence. Schedule tests far enough in advance of starting masonry work to permit retesting if necessary. Sampling and testing shall conform to the applicable provisions of ASTM C67. Units meeting the definition of "effloresced" will be subject to rejection. Submit test results.

3.24.4 Prism Tests

Perform at least one prism test sample for each 5,000 square feet of wall but not less than three such samples shall be made for any building. Three prisms will be used in each sample. Prisms shall be tested in accordance with ACI 530/530.1. Seven-day tests may be used provided the relationship between the 7- and 28-day strengths of the masonry is established by the tests of the materials used. Compressive strength shall not be less than 3,000 psi at 28 days. If the compressive strength of any prism falls below the specified value by more than 500 psi, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. If the likelihood of low-strength masonry is confirmed and computations indicate that the load-carrying capacity may have been significantly reduced, tests of cores drilled, or prisms sawed, from the area in question may be required. In such case, three specimens shall be taken for each prism test more than 500 psi below the specified value. Masonry in the area in question shall be considered structurally adequate if the average compressive strength of three specimens is equal to at least 85 percent of the specified value, and if the compressive strength of no single specimen is less than 75 percent of the specified value. Additional testing of specimens extracted from locations represented by erratic core or prism strength test results will be permitted. Submit test results.

3.24.5 Single-Wythe Masonry Wall Water Penetration Test

Prior to start of field construction of the single-wythe masonry wall, perform masonry wall water penetration test on mock-up wall assemblies consisting of the identical design, materials, mix, and construction methods as the actual wall construction and in accordance with ASTM E514/E514M. Prepare a minimum of three specimens and cure for minimum 28 days prior to testing. Construct panels by the same methods, processes, and applications to be used on the project's construction site. The spray test duration shall be 6 hours for each specimen. No water shall be visible on back of test panels during the test and any areas of dampness on the backside of the test panels shall not exceed 25 percent of the wall area. Dampness is defined as any area of surface darkening or discoloration due to moisture penetration or accumulation below the observed surface. Construct additional test panels for each failed test performed until three test panels pass the test. Factors that can affect test performance include materials, mixing, and quality of application and workmanship. Materials, mixing, and methods adjustments may be necessary in order to provide construction that passes the water penetration test. Document and record the test specimen construction materials and application and provide written test report in accordance with ASTM E514/E514M, supplemented by a

detailed discussion of the specifics of test panel construction, application methods and processes used, quality of construction, and any variances or deviations that may have occurred between test panels during test panel construction. For failed test panels, identify in the supplemental report any variances, deficiencies or flaws that contributed to test panel failure and itemize the precautions to be taken in field construction of the masonry wall to prevent similar deficiencies and assure the wall construction replicates test panel conditions that pass the water penetration test. Submit the complete, certified test report, including supplemental report, to the Contracting Officer prior to start of single-wythe masonry wall construction. Significant changes to materials, proportions, or construction techniques from those used in the passing water penetration test are grounds for performing new tests, at the discretion of the Contracting Officer.

-- End of Section --

SECTION 05 21 00

STEEL JOIST FRAMING
05/15

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2012) International Building Code

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC PA 1	(2000; E 2004) Shop, Field, and Maintenance Painting of Steel
SSPC Paint 15	(1999; E 2004) Steel Joist Shop Primer
SSPC SP 2	(1982; E 2000; E 2004) Hand Tool Cleaning

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

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

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

SD-01 Preconstruction Submittals

Welder Qualification

SD-02 Shop Drawings

Steel Joist Framing; G

SD-06 Test Reports

Erection Inspection
Welding Inspections

SD-07 Certificates

Certification of Compliance

1.3 QUALITY ASSURANCE

Perform all work in compliance with the requirements set forth in 29 CFR 1926.

1.3.1 Drawing Requirements

Submit drawings of steel joist framing including fabrication, specifications for shop painting, and identification markings of joists. Show joist type and size, layout in plan, all applicable loads, deflection criteria, and erection details including methods of anchoring, framing at openings, type, size, and location and connections for and spacing of bridging, requirements for field welding, and details of accessories as applicable.

1.3.2 Certification of Compliance

Prior to construction commencement, submit certification for welder qualification, in compliance with AWS D1.1/D1.1M, 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:

a. SJI MANUAL

b. Steel Joist Institute Member Fabricator

c. 29 CFR 1926

d. 29 CFR 1926.757

e. Statement from steel joist manufacturer, that work was performed in accordance with approved construction documents and with SJI standard specifications, in accordance with ICC IBC Section 1704.2.5.2.

1.4 DELIVERY, STORAGE, AND HANDLING

Handle, transport, and store joists in a manner to prevent damage affecting their structural integrity. Verify piece count of all joist products upon delivery and inspect all joists products for damage. Report any damage to the joist supplier. Store all items off the ground in a well drained location protected from the weather and easily accessible for inspection and handling. Store joists with top chord down and with joists in a vertical position. Store deep joists horizontally if they were shipped on their sides.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Designate steel joists on the drawings in accordance with the standard designations of the Steel Joist Institute. Joists of other standard designations or joists with properties other than those shown may be substituted for the joists designated provided the structural properties are equal to or greater than those of the joists shown and provided all other specified requirements are met.

2.2 STEEL JOISTS

Provide steel joists conforming to SJI LOAD TABLES. Design joists designated K, KCS, LH and DLH to support the loads given in the applicable standard load tables of SJI LOAD TABLES. Include cover letter signed and sealed by the joist manufacturer's registered design professional.

2.3 ACCESSORIES AND FITTINGS

2.3.1 Bridging

Provide bridging of material, size, and type required by SJI LOAD TABLES for type of joist, chord size, spacing and span. Furnish additional erection bridging if required for stability.

2.3.2 Bearing Plates

Fabricate steel bearing plats from ASTM A36/A36M steel of size and thickness indicated.

2.4 SHOP PAINTING

SSPC Paint 15. Shop prime joists, except as modified herein, in accordance with SSPC PA 1. Clean joists in accordance with SSPC SP 2 before priming. If flash rusting occurs, re-clean the surface prior to application of primer. For joists which require finish painting under Section 09 90 00 PAINTS AND COATINGS, the primer paint must be compatible with the finish paint.

PART 3 EXECUTION

3.1 ERECTION

Install joists in conformance with SJI LOAD TABLES for the joist series indicated, and the requirements of 29 CFR 1926 and 29 CFR 1926.757. Handle and set joists avoiding damage to the members. Place the "tag end" of joists as shown on the joists placement plans. Ensure that square-end

joists are erected right side up. Distribute temporary loads so that joist capacity is not exceeded. Remove damaged joists from the site, except when field repair is approved and such repairs are satisfactorily made in accordance with the manufacturer's recommendations. Do not repair, field modify, or alter any joists without specific written instructions from the Designer of Record and/or joist manufacturer.

Install and connect bridging concurrently with joist erection, before construction loads are applied. Do not apply loads to bridging. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams. Do not cut away vertical leg of bridging where bridging makes an elevation transition; weld a separate piece of bridging at the transition. Perform all welding in accordance with AWS D1.1/D1.1M.

3.2 BEARING PLATES

Provide bearing plates to accept full bearing after the supporting members have been plumbed and properly positioned, but prior to placing superimposed loads. The area under the plate must be damp-packed solidly with bedding mortar, except where nonshrink grout is indicated on the drawings. Provide bedding mortar and grout as specified in Section 03 30 00 CAST-IN-PLACE CONCRETE.

3.3 PAINTING

3.3.1 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.

3.4 VISUAL INSPECTIONS

Perform the following visual inspections:

a. Verify that all joists are spaced properly.

b. Verify that there is sufficient joist bearing on steel beams, concrete, and masonry.

c. Verify all bridging lines are properly spaced and anchored.

d. Verify that damage has not occurred to the joists during erection.

e. Verify the joists are aligned vertically and there is no lateral sweep in the joists.

f. Where concentrated loads are present on the joists verify that they are located in accordance with the joists placement plan.

g. Verify welding of bridging and joist seats in accordance with AWS D1.1/D1.1M, Section 6. Perform erection inspection and field welding inspections with AWS certified welding inspectors.

h. Verify proper bolting of diagonal bridging and joist seats where the bolts are snug-tight.

-- End of Section --

SECTION 05 30 00

STEEL DECKS
05/15

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI D100	(1991; R 2008) Cold-Formed Steel Design Manual

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	(2014) 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	(2014) 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 1-28R	(1998) Data Sheet: Roof Systems

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20	(2002; E 2004) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)

STEEL DECK INSTITUTE (SDI)

ANSI/SDI C	(2011; Int 1 2012; Errata 1 2012) Standard for Composite Steel Floor Deck - Slabs
ANSI/SDI NC	(2010) Standard for Non-Composite Steel Floor Deck
ANSI/SDI RD	(2010) Standard for Steel Roof Deck
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; Change 1) Structural Engineering

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

29 CFR 1926	Safety and Health Regulations for Construction

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 Fire Resistance (2014) Fire Resistance Directory

1.2 SUBMITTALS

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

SD-02 Shop Drawings

Fabrication Drawings; G

SD-03 Product Data

Accessories

Deck Units

Galvanizing Repair Paint

Mechanical Fasteners

Touch-up Paint

Welding Equipment

Welding Rods and Accessories

SD-04 Samples

Metal Roof Deck Units

Flexible Closure Strips

SD-05 Design Data

Deck Units; G

SD-07 Certificates

Powder-Actuated Tool Operator

Welder Qualifications

Welding Procedures

Fire Safety

Wind Storm Resistance

Manufacturer's Certificate

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 certificate

attesting that the decking material meets the specified requirements.

1.3.2 Certification of Powder-Actuated Tool Operator

Provide manufacturer's certificate attesting that the operators are authorized to use the low velocity powder-actuated tool.

1.3.3 Qualifications for Welding Work

Follow Welding Procedures of AWS D1.3/D1.3M for sheet steel and AWS D1.1/D1.1M for stud welding.

Submit qualified Welder Qualifications in accordance with AWS D1.3/D1.3M for sheet steel and AWS D1.1/D1.1M for stud welding, or under an equivalent approved qualification test. Perform tests on test pieces in positions and with clearances equivalent to those actually encountered. Test specimens shall be made in the presence of Contracting Officer and shall be tested by an approved testing laboratory at the Contractor's expense. 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.

Submit manufacturer's catalog data for Welding Equipment and Welding Rods and Accessories.

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 Fire Resistance, 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 a nominal uplift pressure of 35 pounds per square foot when tested in accordance with the uplift pressure test described in the FM DS 1-28R 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, cant strips, ridge and valley plates, metal closure strips, 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 DECK UNITS

Submit manufacturer's design calculations, or applicable published literature for the structural properties of the proposed deck units.

2.1.1 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 0.0295 inch design thickness or thicker steel and galvanized. Furnish sample of Metal Roof Deck Units used to illustrate actual cross section dimensions and configurations.

2.1.2 Composite Deck

Conform to ASTM A653/A653M or ASTM A1008/A1008M for composite deck assembly. Fabricate deck used as the tension reinforcing in composite deck of 0.0295 inch design thickness or thicker steel with integrally embossed or raised pattern ribs. The steel design thickness required by the design drawings. Zinc-coat in conformance with ASTM A653/A653M, G90 coating class. Shore composite deck until the concrete has reached 75 percent of its specified strength.

2.1.3 Length of Deck Units

Provide deck units of sufficient length to span three or more spacings where possible.

2.1.4 Touch-Up Paint

Provide a high zinc-dust content paint for regalvanizing welds in galvanized steel conforming to ASTM A780/A780M.

Provide touch-up paint for zinc-coated units of an approved galvanizing repair paint with a high-zinc dust content . Touch-up welds with paint conforming to SSPC Paint 20 in accordance with ASTM A780/A780M. Maintain finish of deck units and accessories by using touch-up paint whenever necessary to prevent the formation of rust.

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 0.0295 inch thick to close open ends at eaves, and openings through deck.

2.2.3 Partition Closures

Provide closures for closing voids above interior walls and partitions that are perpendicular to the direction of the configurations. Provide rubber, plastic, or sheet steel closures above typical partitions. Provide sheet steel closures above fire-resistant interior walls and partitions located on both sides of wall or partition.

2.2.4 Flexible Closure Strips for Roof Decks

Provide strips made of vulcanized, closed-cell, synthetic rubber material specified and premolded to the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

Conforming to ASTM D1056, Grade 2A1, 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 as recommended by the manufacturer of the flexible closure strips.

2.2.5 Closure Plates for Composite Deck

Support and retain concrete at each floor level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Provide metal closures for all openings in composite steel deck 1/4 inch and over.

2.2.6 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.

2.2.7 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.

2.2.8 Access Hole Covers

Sheet metal, minimum 0.0474 inch thick.

2.2.9 Hanger

Provide clips or loops for utility systems of the following type:

Decking manufacturer's standard as approved by the Contracting Officer.

2.2.10 Cant Strips for Roof Decks

Fabricate cant strips from the specified commercial-quality steel sheets not less than nominal 0.0358 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.

2.2.11 Ridge and Valley Plates for Roof Decks

Fabricate plates from the specified structural-quality steel sheets, not less than nominal 0.0358 inch thick before galvanizing. Provide plates of minimum 4-1/2 inch wide and bent to provide tight fitting closures at ridges and valleys. Provide a minimum length of ridge and valley plates of 10 feet.

2.2.12 Metal Closure Strips for Roof Decks

Fabricate strips from the specified commercial-quality steel sheets not less than nominal 0.0358 inch thick before galvanizing. Provide strips from the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

2.2.13 Galvanized Steel Angles for Roof Decks

Provide hot-rolled carbon steel angles conforming to ASTM A36/A36M, and hot-dip galvanized in accordance with ASTM A123/A123M.

2.2.14 Mechanical Fasteners

Provide mechanical fasteners, such as powder actuated fasteners, pneumatically driven fasteners or self-drilling screws, for anchoring the deck to structural supports and adjoining units that are designed to meet the loads indicated.

2.2.15 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 of 0.0358 inch unless otherwise indicated.

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 29 CFR 1926, Subpart R - Steel Erection, ANSI/SDI RD and 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 2 inch deck ends. 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. Size cellular decking provided as electrical raceways to accommodate indicated wiring systems. Chip off burrs and eliminate sharp edges which may damage wiring. Mesh decking panels accurately and place in accordance with UL 209.

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 normal 5/8 inch diameter puddle welds, as indicated on the design drawings and in accordance with manufacturer's recommended procedure and ANSI/SDI RD. 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 D1.3/D1.3M make welds. Immediately recertify, or replace qualified welders, that are producing unsatisfactory welding. Conform to the recommendations of the Steel Deck Institute and the steel deck manufacturer for 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. 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.

3.2.1.2 Mechanical Fastening

Anchor deck to structural supports and adjoining units with mechanical fasteners. Drive the powder-actuated fasteners with a low-velocity piston tool by an operator authorized by the manufacturer of the powder-actuated tool. Drive pneumatically fasteners with a low-velocity fastening tool and comply with the manufacturer's recommendations. Drive screws to properly clamp desk to supporting steel.

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. Deck manufacturer shall approve holes or openings larger than 6 inch in diameter prior to drilling or cutting.

3.2.3 Deck Damage

SDI MOC2, for repair of deck damage.

3.2.4 Touch-Up Paint

3.2.4.1 Roof Deck

After roof decking installation, wire brush, clean, and touchup the scarred areas on top and bottom surfaces of metal roof decking. The scarred areas include welds, weld scars, bruises, and rust spots. Touchup galvanized surfaces with galvanizing repair paint.

3.2.5 Accessory Installation

3.2.5.1 Adjusting Plates

Provide in locations too narrow to accommodate full-size deck units and install as shown on shop drawings.

3.2.5.2 End Closures

Provide end closure to close open ends of cells at columns, walls, and openings in deck.

3.2.5.3 Closures Above Partitions

Provide for closing voids between cells over partitions that are perpendicular to direction of cells. Provide a one-piece closure strip for partitions 4 inch nominal or less in thickness and two-piece closure strips for wider partitions.

3.2.5.4 Cover Plates

Provide metal cover plates, or joint tape, at joints between cellular

decking sheets to be used as electrical raceways. Where concrete leakage would be a problem, provide metal cover plates, or joint tape, at joints between decking sheets, cellular or noncellular, to be covered with concrete fill.

3.2.5.5 Access Hole Covers

Provide access whole covers to seal holes cut in decking to facilitate welding of the deck to structural supports.

3.2.5.6 Hangers

Provide as indicated to support utility system. Space devices as indicated.

3.2.6 Concrete Work

Prior to placement of concrete, inspect installed decking to ensure that there has been no permanent deflection or other damage to decking. Replace decking which has been damaged or permanently deflected as approved by the Contracting Officer. Place concrete on metal deck in accordance with Construction Practice of ANSI/SDI C or ANSI/SDI NC.

3.2.7 Preparation of Fire-Proofed Surfaces

Provide deck surfaces, both composite and noncomposite, which are to receive sprayed-on fireproofing, galvanized and free of all grease, mill oil, paraffin, dirt, salt, and other contaminants which impair adhesion of the fireproofing. Complete any required cleaning prior to steel deck installation using a cleaning method that is compatible with the sprayed-on fireproofing.

3.3 ROOF SUMP PANS

Place sump pans over openings in roof decking and fusion welded to top surface of roof decking. Do not exceed spacing of welds of 12 inch with not less than one weld at each corner. Field cut opening in the bottom of each roof sump pan to receive the roof drain as part of the work of this section.

3.4 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.

3.5 RIDGE AND VALLEY PLATES FOR ROOF DECKS

Provide plates to be fusion welded to top surface of roof decking. Lap end joints a minimum 3 inch. For valley plates, provide endlaps to be in the direction of water flow.

3.6 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.

3.7 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.

3.8 CLEANING AND PROTECTION FOR ROOF DECKS

Upon completion of the deck, sweep surfaces clean and prepare for installation of the roofing.

3.9 FIELD QUALITY CONTROL

3.9.1 Deck Weld Inspection

Visual inspect welds in accordance with AWS D1.3/D1.3M.

-- End of Section --

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.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

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	(2012) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
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	(2013) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B108/B108M	(2012; E 2012) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B209	(2010) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B221	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B26/B26M	(2012) Standard Specification for Aluminum-Alloy Sand Castings
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

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-02 Shop Drawings

Fabrication drawings of structural steel door frames; G

Embedded angles and plates, installation drawings; G

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-04 Samples

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 Anchor Bolts

ASTM A307. Where exposed, shall be of the same material, color, and finish as the metal to which applied.

2.1.5.1 Adhesive Anchors

Provide 5/8in. diameter #5 bar adhesive anchors. Minimum masonry embedment shall be 5-5/8in. Design values listed shall be as tested according to ASTM E488/E488M.

a. Minimum allowable pullout value shall be 2840 lb.

b. Minimum allowable shear value shall be 2615 lb.

2.1.5.2 Lag Screws and Bolts

ASME B18.2.1, type and grade best suited for the purpose.

2.1.5.3 Toggle Bolts

ASME B18.2.1.

2.1.5.4 Bolts, Nuts, Studs and Rivets

ASME B18.2.2 or ASTM A307.

2.1.5.5 Powder Actuated Fasteners

Follow safety provisions of ASSE/SAFE A10.3.

2.1.5.6 Screws

ASME B18.2.1, ASME B18.6.2, ASME B18.6.3 and ASTM C1513.

2.1.5.7 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.

2.1.6 Aluminum Alloy Products

Conform to ASTM B209 for sheet plate, ASTM B221 for extrusions and ASTM B26/B26M or ASTM B108/B108M for castings, as applicable. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

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, 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 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.2.5 Aluminum Surfaces

2.2.5.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.2.5.2 Aluminum Finishes

Unexposed sheet, plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, AA DAF45. Unless otherwise specified, provide all other aluminum items with a standard mill finish. Provide a coating thickness not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations in AA DAF45. Provide a polished satin finish on items to be anodized.

2.3 GUARD POSTS (BOLLARDS/PIPE GUARDS)

Provide 6 inch galvanized standard weight steel pipe as specified in ASTM A53/A53M. Anchor posts in concrete and fill solidly with concrete with minimum compressive strength of 2500 psi.

2.4 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. Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as indicated and as required to support wall loads over openings. Provide with connections and fasteners or

welds. Construct to have at least 8 inches bearing on masonry at each end.

Provide angles and plates, ASTM A36/A36M, for embedment as indicated. Galvanize embedded items exposed to the elements according to ASTM A123/A123M.

2.5 STRUCTURAL STEEL DOOR FRAMES

Provide frames of rolled shapes as indicated. Miter and weld heads to jambs, or have riveted clip angle connections concealed in the finished work. Provide frames for swinging doors with 5/8 by 1 1/2 inch solid bar stops secured to the frame by welding or by 1/4 inch diameter countersunk machine screws spaced not more than 12 inches on centers. Stiffen head openings greater than 3 feet sufficient to limit deflection to not more than 1/16 inch. Secure frames to masonry with zinc-coated metal anchors spaced not more than 30 inches on centers. Where necessary to engage the threads of machine screws for fastening hardware, back frames on inside faces with steel plates of suitable thickness; tap frames and reinforcing plates as necessary for the installation of hardware and other work. Countersink rivets and screw heads where exposed in the finished work. Grind welds smooth.

2.6 DOWNSPOUT BOOTS

Provide cast iron downspout boots with receiving bells sized to fit downspouts.

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 COVER PLATES AND FRAMES

Install the tops of cover plates and frames flush with floor.

3.8 INSTALLATION OF DOWNSPOUT BOOTS

Secure downspouts to building through integral lips with appropriate fasteners.

-- End of Section --

SECTION 06 10 00

ROUGH CARPENTRY
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 LUMBER STANDARDS COMMITTEE (ALSC)

ALSC PS 20	(2010) American Softwood Lumber Standard

AMERICAN WOOD COUNCIL (AWC)

AWC NDS	(2012) National Design Specification (NDS) for Wood Construction
AWC WFCM	(2012) Wood Frame Construction Manual for One- and Two-Family Dwellings

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA BOOK	(2012) AWPA Book of Standards
AWPA M2	(2011) Standard for Inspection of Treated Wood Products
AWPA M6	(2013) Brands Used on Preservative Treated Materials
AWPA P18	(2010) Nonpressure Preservatives
AWPA P5	(2007) Standard for Waterborne Preservatives

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA L870	(2010) Voluntary Product Standard, PS 1-09, Structural Plywood

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 B18.5.2.1M	(2006; R 2011) Metric Round Head Short Square Neck Bolts
ASME B18.5.2.2M	(1982; R 2010) Metric Round Head Square

Neck Bolts

ASME B18.6.1 (1981; R 2008) Wood Screws (Inch Series)

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A307 (2012) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

ASTM F1667 (2013) Driven Fasteners: Nails, Spikes, and Staples

ASTM F547 (2006; R 2012) Nails for Use with Wood and Wood-Base Materials

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001 (2000) Principles and Criteria for Forest Stewardship

GREEN SEAL (GS)

GS-36 (2011) Commercial Adhesives

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2012) International Building Code

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

NHLA Rules (2011) Rules for the Measurement & Inspection of Hardwood & Cypress

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules (2013) Standard Grading Rules for Northeastern Lumber

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

RIS Grade Use (1998) Redwood Lumber Grades and Uses

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)

SCMA Spec (1986; Supple. No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB 1003 (2002) Standard Grading Rules for Southern Pine Lumber

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1923	(Rev A; Notice 2) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)
CID A-A-1924	(Rev A; Notice 2) Shield, Expansion (Self Drilling Tubular Expansion Shell Bolt Anchors
CID A-A-1925	(Rev A; Notice 2) Shield Expansion (Nail Anchors)
FS UU-B-790	(Rev A; Am 1; Notice 1) Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant)

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB 17	(2004) Standard Grading Rules

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA G-5	(2011) Western Lumber Grading Rules

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

SD-02 Shop Drawings

Nailers and Nailing Strips; G

Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

SD-03 Product Data

Local/Regional Materials;

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Salvaged Lumber;

Recovered Lumber;

Documentation certifying products are from salvaged/recovered lumber sources. Indicate relative dollar value of salvaged

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

SD-05 Design Data

Design analysis and calculations showing design criteria used to accomplish the applicable analysis.

SD-06 Test Reports

Preservative-treated lumber

SD-07 Certificates

Forest Stewardship Council (FSC) Certification;

Certificates of grade

Manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material not normally grade marked meet the specified requirements. Certificate of Inspection for grade marked material by an American Lumber Standards Committee (ALSC) recognized inspection agency prior to shipment.

Preservative treatment

SD-10 Operation and Maintenance Data

Include 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.

SD-11 Closeout Submittals

Local/Regional Materials;

Adhesives;

Certified Wood;

1.3 DELIVERY AND STORAGE

Deliver materials to the site in an undamaged condition. Store, protect, handle, and install prefabricated structural elements in accordance with manufacturer's instructions and as specified. Store materials off the ground to provide proper ventilation, with drainage to avoid standing water, and protection against ground moisture and dampness. Store materials with a moisture barrier at both the ground level and as a cover forming a well ventilated enclosure. Adhere to requirements for stacking, lifting, bracing, cutting, notching, and special fastening requirements. Remove defective and damaged materials and provide new materials. Store separated reusable wood waste convenient to cutting station and area of work.

1.4 GRADING AND MARKING

1.4.1 Lumber

Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

1.4.2 Plywood

Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark shall identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with APA L870.Surfaces that are to be exposed to view shall not bear grademarks or other types of identifying marks.

1.4.3 Preservative-Treated Lumber and Plywood

The Contractor shall be responsible for the quality of treated wood products. Each treated piece shall be inspected in accordance with AWPA M2 and permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor shall provide Contracting Officer's Representative (COR) with the inspection report of an approved independent inspection agency that offered products comply with applicable AWPA Standards. The appropriate Quality Mark on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

1.5 SIZES AND SURFACING

ALSC PS 20 for dressed sizes of yard and structural lumber. Lumber shall be surfaced four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced. Other measurements are IP or SI standard.

1.6 MOISTURE CONTENT

Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products shall be as follows at the time of delivery to the job site:

a. Framing lumber and board, 19 percent maximum

b. Timbers 5 inches and thicker, 25 percent maximum

c. Materials other than lumber; moisture content shall be in accordance with standard under which the product is produced

1.7 PRESERVATIVE TREATMENT

Treat wood products with waterborne wood preservatives conforming to AWPA P5. Pressure treatment of wood products shall conform to the requirements of AWPA BOOK Use Category System Standards U1 and T1. Pressure-treated wood

products shall not contain arsenic, chromium, or other agents classified as carcinogenic, probably carcinogenic, or possibly carcinogenic to humans (compounds in Groups 1, 2A, or 2B) by the International Agency for Research on Cancer (IARC), Lyon, France. Pressure-treated wood products shall not exceed the limits of the U.S. EPA's Toxic Characteristic Leaching Procedure (TCLP), and shall not be classified as hazardous waste. Submit certification from treating plant stating chemicals and process used and net amount of preservatives retained are in conformance with specified standards.

a. 0.25 pcf intended for above ground use.

b. 0.40 pcf intended for ground contact and fresh water use. 0.60 pcf intended for Ammoniacal Copper Quaternary Compound (ACQ)-treated foundations. 0.80 to 1.00 pcf intended for ACQ-treated pilings. All wood shall be air or kiln dried after treatment. Specific treatments shall be verified by the report of an approved independent inspection agency, or the AWPA Quality Mark on each piece. Minimize cutting and avoid breathing sawdust. Brush coat areas that are cut or drilled after treatment with either the same preservative used in the treatment or with a 2 percent copper naphthenate solution. All lumber and woodwork shall be preservative treated. Plastic lumber shall not be preservative treated. The following items shall be preservative treated:

1. Wood framing, woodwork, and plywood up to and including the subflooring at the first-floor level of structures having crawl spaces when the bottoms of such items are 24 inches or less from the earth underneath.

2. Wood members that are in contact with water.

3. Exterior wood steps, platforms, and railings; and all wood framing of open, roofed structures.

4. Wood sills, soles, plates, furring, and sleepers that are less than 24 inches from the ground, furring and nailers that are set into or in contact with concrete or masonry.

5. Nailers, edge strips, crickets, curbs, and cants for roof decks.

1.7.1 Existing Structures

Use borate, permathrin, or a sodium silicate wood mineralization process to treat wood. Use borate for interior applications only.

1.7.2 New Construction

Use a boron-based preservative conforming to AWPA P18, sodium silicate wood mineralization process, or Ammoniacal Copper Quaternary Compound to treat wood. Use boron-based preservatives for above-ground applications only.

1.8 QUALITY ASSURANCE

1.8.1 Certificates of Grade

Submit certificates attesting that products meet the grade requirements specified in lieu of grade markings where appearance is important and grade marks will deface material.

1.8.2 Humidity Requirements

Sequence work to minimize use of temporary HVAC to dry out building and control humidity.

1.9 ENVIRONMENTAL REQUIREMENTS

During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.

1.10 SUSTAINABLE DESIGN REQUIREMENTS

1.10.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.

1.10.2 Certified Wood

Wood products shall be FSC-certified as specified herein.

1.10.3 Forest Stewardship Council (FSC) Certification

Use FSC-certified wood where specified. Provide letter of certification signed by lumber supplier. Indicate compliance with FSC STD 01 001 and identify certifying organization. Submit FSC certification numbers; identify each certified product on a line-item basis. Submit copies of invoices bearing the FSC certification numbers.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Virgin Lumber

Lumber fabricated from old growth timber is not permitted. Avoid companies who buy, sell, or use old growth timber in their operations, when possible. Lumber shall be FSC-certified.

2.1.2 Salvaged Lumber

Provide salvaged lumber where specified. Unless otherwise noted, salvaged lumber shall be delivered clean, denailed, and free of paint, finish materials, and other contamination.

2.1.3 Recovered Lumber

Use recovered lumber where practical. Unless otherwise noted, recovered lumber shall be delivered clean and free of contamination. Provide grading certificates for any recovered wood materials used in structural applications.

2.1.4 Natural Decay- and Insect-Resistant Wood

Naturally durable wood shall be FSC-certified or salvaged. An occasional piece with corner sapwood shall be permitted if 90 percent or more of the

width of each side on which the sapwood occurs is heartwood.

2.2 LUMBER

2.2.1 Framing Lumber

Framing lumber such as studs, plates, caps, collar beams, cant strips, bucks, sleepers, nailing strips, and nailers and board lumber such as subflooring and wall and roof sheathing shall be one of the species listed in the table below. Minimum grade of species shall be as listed.

Table of Grades for Framing and Board Lumber

Grading Rules	Species	Framing	Board Lumber
WWPA G-5 standard grading rules	Aspen, Douglas Fir-Larch, Douglas Fir South, Engelmann Spruce-Lodgepole Pine, Engelmann Spruce, Hem-Fir, Idaho White Pine, Lodgepole Pine, Mountain Hemlock, Mountain Hemlock-Hem-Fir, Ponderosa Pine-Sugar Pine, Ponderosa Pine-Lodgepole Pine, Subalpine Fir, White Woods, Western Woods, Western Cedars, Western Hemlock	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	All Species: No. 3 Common

Table of Grades for Framing and Board Lumber

Grading Rules	Species	Framing	Board Lumber
WCLIB 17 standard grading rules	Douglas Fir-Larch, Hem-Fir, Mountain Hemlock, Sitka Spruce, Western Cedars, Western Hemlock	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	All Species: Standard
SPIB 1003 standard grading rules	Southern Pine	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	No. 2 Boards
SCMA Spec standard specifications	Cypress	No. 2 Common	No. 2 Common
NELMA Grading Rules standard grading rules	Balsam Fir, Eastern Hemlock-Tamarack, Eastern Spruce, Eastern White Pine, Northern Pine, Northern Pine-Cedar	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	All Species: No. 3 Common except Standard for Eastern White and Northern Pine

Table of Grades for Framing and Board Lumber			
Grading Rules	Species	Framing	Board Lumber
RIS Grade Use standard specifications	Redwood	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	Construction Heart
NHLA Rules rules for the measurement and inspection of hardwood and cypress lumber	Cypress	No. 2 Dimension	No. 2 Common

2.3 OTHER MATERIALS

2.3.1 Building Paper

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

2.3.2 Miscellaneous Wood Members

2.3.2.1 Nonstress Graded Members

Members shall include bridging, corner bracing, furring, grounds, and nailing strips. Members shall be in accordance with TABLE I for the species used. Sizes shall be as follows unless otherwise shown:

Member	Size inch
Bridging	1 x 3 or 1 x 4 for use between members 2 x 12 and smaller; 2 x 4 for use between members larger than 2 x 12.
Corner bracing	1 x 4.
Furring	1 x 3
Grounds	Plaster thickness by 38.

Member	Size inch
Nailing strips	1 x 3 or 1 x 4 when used as shingle base or interior finish, otherwise 2 inch stock.

2.3.2.2 Blocking

Blocking shall be standard or number 2 grade.

2.3.2.3 Rough Bucks and Frames

Rough bucks and frames shall be straight standard or number 2 grade.

2.3.3 Adhesives

Comply with applicable regulations regarding toxic and hazardous materials, GS-36 and as specified.

2.4 ROUGH HARDWARE

Unless otherwise indicated or specified, rough hardware shall be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of manufactured building materials shall be as recommended by the product manufacturer unless otherwise indicated or specified. Fasteners shall be fabricated from 100 percent re-melted steel. Rough hardware exposed to the weather or embedded in or in contact with preservative treated wood, exterior masonry, or concrete walls or slabs shall be hot-dip zinc-coated in accordance with ASTM A153/A153M. Nails and fastenings for fire-retardant treated lumber and woodwork exposed to the weather shall be copper alloy or hot-dipped galvanized fasteners as recommended by the treated wood manufacturer.

2.4.1 Bolts, Nuts, Studs, and Rivets

ASME B18.2.1, ASME B18.5.2.1M, ASME B18.5.2.2M and ASME B18.2.2.

2.4.2 Anchor Bolts

ASTM A307, size as indicated, complete with nuts and washers.

2.4.3 Expansion Shields

CID A-A-1923, CID A-A-1924, and CID A-A-1925. Except as shown otherwise, maximum size of devices shall be 3/8 inch.

2.4.4 Lag Screws and Lag Bolts

ASME B18.2.1.

2.4.5 Wood Screws

ASME B18.6.1.

2.4.6 Nails

ASTM F547, size and type best suited for purpose. For sheathing and subflooring, length of nails shall be sufficient to extend 1 inch into

supports. In general, 8-penny or larger nails shall be used for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber; 16-penny or larger nails shall be used for nailing through 2 inch thick lumber. Nails used with treated lumber and sheathing shall be hot-dipped galvanized in accordance with ASTM A153/A153M. Nailing shall be in accordance with the recommended nailing schedule contained in AWC WFCM. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AWC NDS. Reasonable judgment backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used.

2.4.7 Wire Nails

ASTM F1667.

2.4.8 Clip Angles

Steel, 3/16 inch thick, size best suited for intended use; or zinc-coated steel or iron commercial clips designed for connecting wood members.

2.4.9 Joist Anchors

For joists supported by masonry walls, provide anchors 3/16 by 1 1/2 inch steel tee or strap, bent and of length to provide 4 inches embedment into wall and 12 inches along joist. For joists parallel to masonry or concrete walls, provide anchors 1/4 by 1-1/4 inch minimum cross-sectional area, steel strap, length as necessary to extend over top of first three joists and into wall 4 inches, and with wall end of bend or pin type, except as indicated otherwise.

2.4.10 Door Buck Anchors

Metal anchors, 1/8 by 1-1/4 inch steel, 12 inches long, with ends bent 2 inches , except as indicated otherwise. Anchors shall be screwed to the backs of bucks and built into masonry or concrete. Locate 8 inches above sills and below heads and not more than 24 inches intermediately between.

PART 3 EXECUTION

3.1 INSTALLATION

Conform to AWC WFCM and install in accordance with the National Association of Home Builders (NAHB) Advanced Framing Techniques: Optimum Value Engineering, unless otherwise indicated or specified. Select lumber sizes to minimize waste. Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner. Space plastic lumber boards as necessary to allow for lengthwise expansion and contraction. Do not splice framing members between bearing points. Set joists, rafters, and purlins with their crown edge up. Frame members for the passage of pipes, conduits, and ducts. Provide adequate support as appropriate to the application, climate, and modulus of elasticity of the product. Do not cut or bore structural members for the passage of ducts or pipes without approval. Reinforce all members damaged by such cutting or boring by means of specially formed and approved sheet metal or bar steel shapes, or remove and provide new, as approved. Provide as necessary for the proper completion of the work all framing members not

indicated or specified. Spiking and nailing not indicated or specified otherwise shall be in accordance with the Nailing Schedule contained in ICC IBC; perform bolting in an approved manner. Spikes, nails, and bolts shall be drawn up tight. Install plastic lumber with screws or bolts; if nails are used, use ring shank or spiral shank nails. Use slate or steel shims when leveling joists, beams, and girders on masonry or concrete. Do not use shimming on wood or metal bearings. When joists, beams, and girders are placed on masonry or concrete, a wood base plate shall be positioned and leveled with grout. The joist, beam, or girder shall then be placed on the plate. When joists, beams, and girders are set into masonry or concrete, a pocket shall be formed into the wall. The joist, beam, or girder shall then be placed into the pocket and leveled with a steel shim.

3.2 MISCELLANEOUS

3.2.1 Rough Wood Bucks

2 inch nominal thickness. Set wood bucks true and plumb. Anchor bucks to concrete or masonry with steel straps extending into the wall 8 inches minimum. Place anchors near the top and bottom of the buck and space uniformly at 2 foot maximum intervals.

3.2.2 Wood Blocking

Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.

3.3 WASTE MANAGEMENT

In accordance with the Waste Management Plan and as specified. Separate and reuse scrap sheet materials larger than 2 square feet, framing members larger than 16 inches, and multiple offcuts of any size larger than 12 inches. Clearly separate damaged wood and other scrap lumber for acceptable alternative uses on site, including bracing, blocking, cripples, ties, and shims.

-- End of Section --

SECTION 07 11 13

BITUMINOUS DAMPPROOFING
08/11

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C208	(2012) Cellulosic Fiber Insulating Board
ASTM C728	(2013) Perlite Thermal Insulation Board
ASTM D1187/D1187M	(1997; E 2011; R 2011) Asphalt-Base Emulsions for Use as Protective Coatings for Metal
ASTM D1227	(2013) Emulsified Asphalt Used as a Protective Coating for Roofing
ASTM D226/D226M	(2009) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D227/D227M	(2003; R 2011; E 2012) Coal-Tar-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D41/D41M	(2011) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4263	(1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D43/D43M	(2000; R 2012) Standard Specification for Coal Tar Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4479/D4479M	(2007; E 2012; R 2012) Asphalt Roof Coatings - Asbestos-Free
ASTM D449/D449M	(2003; R 2014; E 2014) Asphalt Used in Dampproofing and Waterproofing
ASTM D450/D450M	(2007; E 2013; R 2013) Coal-Tar Pitch Used in Roofing, Dampproofing, and Waterproofing

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

29 CFR 1926	Safety and Health Regulations for 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. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Materials

1.3 DELIVERY AND STORAGE

Deliver materials in sealed containers bearing manufacturer's original labels. Labels shall include date of manufacture, contents of each container, performance standards that apply to the contents and recommended shelf life.

1.4 SAFETY AND HEALTH REQUIREMENTS

If coal-tar pitch materials are used, the Contractor shall conform to all OSHA 29 CFR 1926 and General Industry Health Standards as well as state and local standards.

PART 2 PRODUCTS

2.1 ASPHALT

ASTM D449/D449M, Type I or Type II.

2.2 ASPHALT PRIMER

ASTM D41/D41M.

2.3 CREOSOTE PRIMER

ASTM D43/D43M.

2.4 COAL-TAR PITCH

ASTM D450/D450M, Type II or Type III.

2.5 FIBROUS ASPHALT

ASTM D4479/D4479M, Type I for horizontal surfaces, Type II for vertical surfaces.

2.6 EMULSION-BASED ASPHALT DAMPPROOFING

2.6.1 Fibrated Emulsion-Based Asphalt

Fibrated emulsion-based asphalt dampproofing shall be cold-applied type conforming to ASTM D1227 Type II, Class 1, asbestos-free, manufactured of refined asphalt, emulsifiers and selected clay, fibrated with mineral fibers. For spray or brush application, emulsion shall contain a minimum of 59 percent solids by weight, 56 percent solids by volume. For trowel application, emulsion shall contain a minimum of 58 percent solids by weight, 55 percent solids by volume.

2.6.2 Non-Fibrated Emulsion-Based Asphalt

Non-fibrated emulsion-based asphalt dampproofing shall be cold-applied type conforming to ASTM D1187/D1187M Type II or ASTM D1227 Type III, manufactured of refined asphalt, emulsifiers and selected clay. Asphalt shall contain a minimum 58 percent solids by weight, 55 percent solids by volume.

2.7 SURFACE PROTECTION

2.7.1 Saturated Felt

ASTM D226/D226M, Asphalt Saturated, Type I, 15 pound; ASTM D227/D227M, Coal-Tar Saturated.

2.7.2 Protection Board

Wood Fiber Board, ASTM C208, or Perlite Board, ASTM C728.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Remove or cut form ties and repair all surface defects as required in Section 03 30 00 CAST-IN-PLACE CONCRETE. Clean masonry surfaces to receive dampproofing of foreign matter and loose particles. Apply dampproofing to clean dry surfaces. Moisture test in accordance with ASTM D4263. If test indicates moisture, allow a minimum of 7 additional days after test completion for curing. If moisture still exists, redo test until substrate is dry.

3.2 Protection of Surrounding Areas

Before starting the dampproofing work, the surrounding areas and surfaces shall be protected from spillage and migration of dampproofing material onto other work.

3.3 APPLICATION

Use either hot-application or cold-application method. Prime surfaces to receive fibrous asphaltic dampproofing unless recommended otherwise by dampproofing materials manufacturer. Apply dampproofing after priming coat is dry, but prior to any deterioration of primed surface, and when ambient temperature is above 40 degrees F.

3.3.1 Surface Priming

Prime surfaces to receive coal-tar pitch dampproofing with creosote primer. Prime surfaces to receive asphalt or fibrous asphalt dampproofing with asphalt primer. Apply primer when ambient temperature is above 40 degrees F and at rate of approximately one gallon per 100 square feet, fully covering entire surface to be dampproofed.

3.3.2 Hot-Application Method

Apply two mop coats of hot coal-tar pitch or two mop coats of hot asphalt to surfaces. Apply mop coats uniformly using not less than 25 pounds of coal-tar pitch or 20 pounds of asphalt per 100 square feet for each coat.

Do not heat asphalt above 450 degrees F. Do not heat coal tar pitch above 400 degrees F. Have kettlemen in attendance at all times during heating to ensure that maximum temperature specified is not exceeded. Apply hot asphalt bitumen or coal tar pitch and fully bond to primed surface. Provide finished surface that is smooth, lustrous, and impervious to moisture. Recoat dull or porous spots.

3.3.3 Cold-Application Method

3.3.3.1 Fibrous Asphalt

Apply two coats of fibrous asphalt to surfaces to be dampproofed. Apply each coat uniformly using not less than one gallon fibrous asphalt per 50 square feet. Apply first coat by brush or spray to provide full bond with primed surface. Brush or spray second coat over thoroughly dry first coat unless recommended otherwise by dampproofing materials manufacturer. Provide finished surface that is of uniform thickness and impervious to moisture. Recoat porous areas.

3.3.3.2 Emulsion-Based Asphalt

Emulsion-based asphalt dampproofing work shall not be performed in temperatures below 40 degrees F. Emulsions shall have a smooth and uniform consistency at time of application. Dampproofing materials shall be applied in accordance with manufacturer's published instructions to produce a smooth uniform dry film of not less than 12 mils thick without voids or defects. Dull or porous spots shall be recoated. Dampproofing materials shall seal tightly around pipes and other items projecting through dampproofing. Rates of application shall be as follows:

a. Primer: 1/2 gallon per 100 square feet, cold-applied.

b. Fibrated Dampproofing: 2 gallons per 100 square feet, cold-applied with spray, brush or trowel.

c. Non-fibrated Dampproofing: 2 gallons per 100 square feet, cold-applied with spray, brush or trowel.

-- End of Section --

SECTION 07 21 13

BOARD AND BLOCK INSULATION
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.

ASTM INTERNATIONAL (ASTM)

ASTM C553	(2013) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C578	(2014) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C591	(2013) Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C930	(2012) Potential Health and Safety Concerns Associated with Thermal Insulation Materials and Accessories
ASTM D3833/D3833M	(1996; R 2011) Water Vapor Transmission of Pressure-Sensitive Tapes
ASTM D4397	(2010) Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM E136	(2012) Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C
ASTM E154/E154M	(2008a; R 2013; E 2013) Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
ASTM E84	(2015a) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2014) Standard Test Methods for Water Vapor Transmission of Materials

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	Scientific Certification Systems (SCS)Indoor Advantage

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY (TAPPI)

TAPPI T803 OM (2010) Puncture Test of Container Board

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

29 CFR 1910.134 Respiratory Protection

UL ENVIRONMENT (ULE)

ULE Greenguard UL Greenguard Certification Program

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-03 Product Data

Block or board insulation; G

Vapor retarder

Pressure sensitive tape

Protection board or coating

Accessories

Certification

SD-08 Manufacturer's Instructions

Block or Board Insulation

Adhesive

1.3 SUSTAINABLE DESIGN CERTIFICATION

Product shall be third party certified in accordance with ULE Greenguard, SCS Scientific Certification Systems Indoor Advantageor equal. Certification shall be performed annually and shall be current.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Deliver materials to the site in original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Do not allow insulation materials to become wet, soiled, crushed, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storing, and protecting of materials before and during installation.

1.4.2 Storage

Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling.

1.5 SAFETY PRECAUTIONS

1.5.1 Respirators

Provide installers with dust/mist respirators, training in their use, and protective clothing, all approved by National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) in accordance with 29 CFR 1910.134.

1.5.2 Other Safety Considerations

Consider safety concerns and measures as outlined in ASTM C930.

PART 2 PRODUCTS

2.1 BLOCK OR BOARD INSULATION

Provide only thermal insulating materials recommended by manufacturer for type of application indicated. Provide board or block thermal insulation conforming to the following standards and the physical properties listed below:

a. Extruded Preformed Cellular Polystyrene: ASTM C578

b. Unfaced Preformed Rigid Polyurethane and Polyisocyanurate Board: ASTM C591

2.1.1 Thermal Resistance

As indicated.

2.1.2 Fire Protection Requirement

a. Flame spread index of 75 or less when tested in accordance with ASTM E84.

b. Smoke developed index of 200 or less when tested in accordance with ASTM E84.

2.1.3 Other Material Properties

Provide thermal insulating materials with the following properties:

a. Water Vapor Permeance: Not more than 1.1 Perms or less when measured according to ASTM E96/E96M, desiccant method, in the thickness required to provide the specified thermal resistance, including facings, if any.

b. Water Adsorption: Not more than 1 percent by volume when measured in accordance with paragraph 14 of ASTM C553.

2.1.4 Recycled Materials

Provide thermal insulation containing recycled materials to the extent practicable, provided that the material meets all other requirements of this section. The minimum required recycled material contents (by weight, not volume) are:

Polyisocyanurate/Polyurethane:	9 percent
Phenolic Rigid Foam:	5 percent

2.1.5 Prohibited Materials

Do not provide materials containing more than one percent of asbestos.

2.2 VAPOR RETARDER

2.2.1 Vapor Retarder for Masonry Cavity Walls

a. 6 mil thick polyethylene sheeting conforming to ASTM D4397 and having a water vapor permeance of one perm (grains/(h*ft2*in.Hg) or less when tested in accordance with ASTM E96/E96M.

b. Membrane with following properties:
Permeance: ASTM E96/E96M, 1 perm (grains/h*ft2*in.Hg)
Maximum Flame Spread: ASTM E84, 25
Combustion Characteristic: Meet ASTM E136
Puncture Resistance: TAPPI T803 OM
- 25 Beach Units (1 Beach Unit is 2.205*10-10 foot/pounds)

2.2.2 Vapor Retarder under Floor Slab

a. Water vapor permeance: 0.2 Perm or less when tested in accordance with ASTM E96/E96M.

b. Puncture resistance: Maximum load no less than 40 pounds when tested according to ASTM E154/E154M.

2.3 PRESSURE SENSITIVE TAPE

As recommended by manufacturer of vapor retarder and having a water vapor permeance rating of one perm or less when tested in accordance with ASTM D3833/D3833M.

2.4 PROTECTION BOARD OR COATING

As recommended by insulation manufacturer.

2.5 ACCESSORIES

2.5.1 Adhesive

As recommended by insulation manufacturer.

2.5.2 Mechanical Fasteners

Corrosion resistant fasteners as recommended by the insulation manufacturer.

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

Before installing insulation, ensure that all areas that will be in contact with the insulation are dry and free of projections which could cause voids, compressed insulation, or punctured vapor retarders. If installing perimeter or under slab insulation, check that the fill is flat, smooth, dry, and well tamped. If moisture or other conditions are found that do not allow the proper installation of the insulation, do not proceed but notify the Contracting Officer of such conditions.

3.2 PREPARATION

3.3 INSTALLATION

3.3.1 Insulation Board

Install and handle insulation in accordance with the manufacturer's installation instructions. Keep material dry and free of extraneous materials. Observe safe work practices.

3.3.2 Electrical Wiring

Do not install insulation in a manner that would sandwich electrical wiring between two layers of insulation.

3.3.3 Continuity of Insulation

Butt tightly against adjoining boards, studs, rafters, joists, sill plates, headers and obstructions. Provide continuity and integrity of insulation at corners, wall to ceiling joint, roof, and floor. Avoid creating any thermal bridges or voids.

3.4 INSTALLATION ON WALLS

3.4.1 Installation on Masonry Walls

Apply board directly to masonry with adhesive or fasteners as recommended by the insulation manufacturer. Fit between obstructions without impaling board on ties or anchors. Apply in parallel courses with joints breaking midway over course below. Put ends in moderate contact with adjoining insulation without forcing. Cut and shape as required to fit around wall penetrations, projections or openings to accommodate conduit or other services. Seal around cut-outs with sealant. Install board in wall cavities so that it leaves at least a nominal one inch free air space outside of the insulation to allow for cavity drainage.

3.4.2 Adhesive Attachment to Concrete and Masonry Walls

Apply adhesive to wall and completely cover wall with insulation.

a. Full back bed method

b. Butt all edges of insulation and seal edges with tape.

3.4.3 Mechanical Attachment on Concrete and Masonry Walls

Cut insulation to cover walls. Apply adhesive to wall and set clip or other mechanical fastener in adhesive as recommended by manufacturer. After curing of adhesive, install insulation over fasteners, bend split prongs flush with insulation. Butt all edges of insulation and seal with tape.

3.4.4 Protection Board or Coating

Install protection board or coating in accordance with manufacturer's instructions. Install protection over all exterior exposed insulation board and down to 1 foot below grade.

3.5 INSTALLATION ON UNDERSIDE OF CONCRETE FLOOR SLAB

3.5.1 Mechanically Fastened Systems

Size insulation to cover underside of slab. Apply adhesive to slab and set fasteners in adhesive as recommended by manufacturer. After curing of adhesive, install insulation over fasteners, bend split prongs flush with insulation. Butt all edges of insulation and seal with tape.

3.5.2 Adhesively Bonded Systems

Apply adhesive to underside of the and completely cover wall with insulation.

a. Full back bed method

b. Butt all edges of insulation and seal with tape.

3.6 PERIMETER AND UNDER SLAB INSULATION

Install perimeter thermal insulation where heated spaces are adjacent to exterior walls or slab edges in slab-on-grade or floating-slab construction.

3.6.1 Manufacturer's Instructions

Install, attach, tape edges, provide vapor retarder and other requirements such as protection against vermin, insects, damage during construction as recommended in manufacturer's instructions.

3.6.2 Insulation on Vertical Surfaces

Install thermal insulation as indicated. Fasten insulation with adhesive or mechanical fasteners.

3.6.3 Insulation Under Slab

Provide insulation horizontally under slab on grade as indicated.

3.6.4 Protection of Insulation

Protect insulation on vertical surfaces from damage during construction and back filling by application of protection board or coating. Do not leave installed vertical insulation unprotected overnight. Provide protection extending at least one foot below grade.

3.7 VAPOR RETARDER

Apply a continuous vapor retarder as indicated. Overlap all joints at least 6 inches and seal with pressure sensitive tape. Seal at sill, header, windows, doors and utility penetrations. Repair punctures or tears with pressure sensitive tape.

-- End of Section --

SECTION 07 22 00

ROOF AND DECK INSULATION
08/11

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C1289	(2014) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM C208	(2012) Cellulosic Fiber Insulating Board
ASTM C552	(2013) Standard Specification for Cellular Glass Thermal Insulation
ASTM C578	(2014) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C726	(2012) Mineral Fiber Roof Insulation Board
ASTM C728	(2013) Perlite Thermal Insulation Board
ASTM D2178/D2178M	(2013a) Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D4263	(1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4601/D4601M	(2004; R 2012) Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
ASTM E84	(2014) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM 4470	(2010) Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/
FM P9513	(2002) Specialist Data Book Set for Roofing Contractors; contains 1-22 (2001), 1-28 (2002), 1-29 (2002), 1-28R/1-29R

(1998), 1-30 (2000), 1-31 (2000), 1-32 (2000), 1-33 (2000), 1-34 (2001), 1-49 (2000), 1-52 (2000), 1-54 (2001)

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	Scientific Certification Systems (SCS)Indoor Advantage

UL ENVIRONMENT (ULE)

ULE Greenguard	UL Greenguard Certification Program

UNDERWRITERS LABORATORIES (UL)

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 Contractor Quality Control approval. 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

Wood nailers
Tapered roof insulation system; G

SD-03 Product Data

Fasteners; G
Insulation; G
Certification

Include minimum thickness of insulation for steel and concrete decks and fastener pattern for insulation on steel decks.

Recycled materials;

MR4; Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product.

Local/Regional Materials;

MR5; Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site.

SD-06 Test Reports

Flame spread and smoke developed ratings

Submit in accordance with ASTM E84.

SD-07 Certificates

Installer qualifications

SD-08 Manufacturer's Instructions

Nails and fasteners

Roof insulation, including field of roof and perimeter attachment requirements.

1.3 MANUFACTURER'S CERTIFICATE

Submit certificate from the insulation manufacturer attesting that the installer has the proper qualifications for installing tapered roof insulation systems.

Certificate attesting that the expanded perlite or polyisocyanurate insulation contains recovered material and showing estimated percent of recovered material. Certificates of compliance for felt materials.

1.4 QUALITY ASSURANCE

1.4.1 Insulation on Concrete Decks

Roof insulation shall have a flame spread rating not greater than 75 and a smoke developed rating not greater than 150, exclusive of covering, when tested in accordance with ASTM E84. Insulation bearing the UL label and listed in the UL Bld Mat Dir as meeting the flame spread and smoke developed ratings will be accepted in lieu of copies of test reports. Compliance with flame spread and smoke developed ratings will not be required when insulation has been tested as part of a roof construction assembly of the type used for this project and the construction is listed as fire-classified in the UL Bld Mat Dir or listed as Class I roof deck construction in the FM APP GUIDE. Insulation tested as part of a roof construction assembly shall bear UL or FM labels attesting to the ratings specified herein.

1.4.2 Sustainable Design Certification

Product shall be third party certified in accordance with ULE Greenguard, SCS Scientific Certification Systems Indoor Advantage or equal. Certification shall be performed annually and shall be current.

1.4.3 Local/Regional Materials

See Section 01 33 29 SUSTAINABLE REQUIREMENTS for cumulative total local material requirements. Roof insulation and materials may be locally available.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials to site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:

a. Name of manufacturer;

b. Brand designation;

c. Specification number, type, and class, as applicable, where materials are covered by a referenced specification; and

d. Asphalt's flashpoint (FP), equiviscous temperature (EVT), and finished blowing temperature (FBT).

Deliver materials in sufficient quantity to allow continuity of the work.

1.5.2 Storage and Handling

Store and handle materials in a manner to protect from damage, exposure to open flame or other ignition sources, and from wetting, condensation or moisture absorption. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. Replace damaged material with new material.

1.6 ENVIRONMENTAL CONDITIONS

Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F and interior humidity is 45 percent or greater, or when there is visible ice, frost, or moisture on the roof deck.

1.7 PROTECTION OF PROPERTY

1.7.1 Flame-Heated Equipment

Locate and use flame-heated equipment so as not to endanger the structure or other materials on the site or adjacent property. Do not place flame-heated equipment on the roof. Provide and maintain a fire extinguisher near each item of flame-heated equipment.

PART 2 PRODUCTS

2.1 INSULATION

2.1.1 Insulation Types

Roof insulation shall be one or an assembly of a maximum of three of the following materials and compatible with attachment methods for the specified insulation and roof membrane:

a. Expanded Perlite Board: ASTM C728. Minimum 3/4 inch thick when both top and bottom surfaces will be in contact with asphalt.

b. Polyisocyanurate Board: ASTM C1289 Type I -- foil faced both sides or Type II, fibrous felt or glass mat membrane both sides, except minimum compressive strength shall be 20 pounds per square inch (psi).

c. Composite Boards: ASTM C1289, Type III, perlite insulation board faced one side, fibrous felt or glass fiber mat membrane on other side. ASTM C1289 (Polyisocyanurate-perlite).

d. Cellular Glass Boards: ASTM C552, Type IV.

e. Polystyrene Board: Shall be in accordance with ASTM C578, Type II, IV, or X.

f. Wood Fiberboard: ASTM C208, high density, except 4 by 4 feet maximum board size.

ASTM C208 Type II, Grade 1 or 2, roof insulating board, treated with sizing, wax or bituminous impregnation. Bituminous impregnation shall be limited to 4 percent by weight when used over steel decks. Maximum board size: 4 feet by 4 feet.

2.1.2 Mineral-Fiber Insulation Board

ASTM C726.

2.1.3 Recovered Materials

Provide thermal insulation materials containing recycled materials to the extent practical. The required minimum recycled material content for the listed materials are:

Perlite Composition Board:	75 percent postconsumer paper
Polyisocyanurate/polyurethane:	9 percent recovered material
Wood Fiberboard:	25 percent recovered material
Cellular Glass Insulation:	75 percent recovered content
Structural Fiberboard:	100 percent recovered content
Fiberglass Insulation:	20-25 percent recovered content
Fiber (felt) or Fiber composite:	50-100 percent recovered content
Rubber:	12-100 percent recovered content
Plastic or Plastic/Rubber composite:	100 percent recovered content
Wood/Plastic Composite:	100 percent Total Recovered content

2.1.4 Insulation Thickness

As necessary to provide a thermal resistance R value as indicated on the drawings. Thickness shall be based on the "R" value for aged insulation. Insulation over steel decks shall satisfy both specified R value and minimum thickness for width of rib opening recommended in insulation manufacturer's published literature.

2.1.5 Tapered Roof Insulation

One layer of the tapered roof insulation assembly shall be factory tapered to a slope of not less than 1/2 inch per foot. Provide starter and filler blocks as required to provide the total thickness of insulation necessary to meet the specified slope and thermal conductance. Mitered joints shall be factory fabricated and shall consist of two diagonally cut boards or one board shaped to provide the required slopes. Identify each piece of tapered insulation board by color or other identity coding system, allowing the identification of different sizes of tapered insulation board required to complete the roof insulation system.

2.1.6 Cants and Tapered Edge Strips

Provide preformed cants and tapered edge strips of the same material as the roof insulation; or, when roof insulation material is unavailable, provide pressure-preservative treated wood, wood fiberboard, or rigid perlite board cants and edge strips as recommended by the roofing manufacturer, unless otherwise indicated. Face of cant strips shall have incline of 45 degrees and vertical height of 4 inches. Taper edge strips at a rate of one to 1 1/2 inch per foot down to approximately 1/8 inch thick.

2.2 MOISTURE CONTROL

2.2.1 Vapor Retarder

2.2.1.1 Asphalt-Saturated Felt Base Sheet for Single Layer Application

ASTM D4601/D4601M, weighing not less than 35 pounds per 100 square feet.

2.2.1.2 Asphalt-Coated Glass Felt

ASTM D2178/D2178M, Type VI.

2.3 FASTENERS

Flush-driven through flat round or hexagonal steel or plastic plates. Steel plates shall be zinc-coated, flat round not less than 1 3/8 inch diameter or hexagonal not less than 28 gage. Plastic plates shall be high-density, molded thermoplastic with smooth top surface, reinforcing ribs and not less than 3 inches in diameter. Fastener head shall recess fully into the plastic plate after it is driven. Plates shall be formed to prevent dishing. Do not use bell-or cup-shaped plates. Fasteners shall conform to insulation manufacturer's recommendations except that holding power, when driven, shall be not less than 120 pounds each in steel deck. Fasteners for steel or concrete decks shall conform to FM APP GUIDE for Class I roof deck construction, and shall be spaced to withstand an uplift pressure of 90 pounds per square foot.

2.3.1 Fasteners for Poured Concrete Decks

Approved hardened fasteners or screws to penetrate deck at least one inch but not more than 1 1/2 inches, conforming to FM 4470, and listed in FM APP GUIDE for Class I roof deck construction. Quantity and placement to withstand an uplift pressure of 90 psf conforming to FM APP GUIDE.

2.4 WOOD NAILERS

Pressure-preservative-treated as specified in Section 06 10 00 ROUGH CARPENTRY.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

3.1.1 Surface Inspection

Surfaces shall be clean, smooth, and dry. Surfaces receiving vapor retarder shall be free of projections which might puncture the vapor retarder.

The Contracting Officer will inspect and approve the surfaces immediately before starting installation. Prior to installing insulation, perform the following:

b. In the presence of the Contracting Officer perform the following surface-dryness test on concrete substrates:

(1) Foaming: When poured on the deck, one pint of asphalt when heated in the range of 350 to 400 degrees F, shall not foam upon contact.

(2) Strippability: After asphalt used in the foaming test application has cooled to ambient temperatures, test coating for adherence. Should a portion of the sample be readily stripped clean from surface, do not consider surface to be dry and do not start application. Should rain occur during application, stop work and do not resume until surface has been tested by method above and found dry.

c. Prior to installing any roof system on a concrete deck, conduct a test per ASTM D4263. The deck is acceptable for roof system application when there is no visible moisture on underside of plastic sheet after 24 hours.

3.1.2 Surface Preparation

Correct defects and inaccuracies in roof deck surface to eliminate poor drainage and hollow or low spots and perform the following:

a. Install wood nailers the same thickness as insulation at edges for securing gutters, and flashing flanges. Space nailers in accordance with approved shop drawings.

c. Solidly apply asphalt primer to poured concrete decks at the rate of one gallon per 100 square feet of roof surface . Allow primer to dry thoroughly.

3.2 INSTALLATION OF VAPOR RETARDER

Install vapor retarder in direct contact with roof deck surface . Vapor retarder shall consist of either two plies of No. 15 asphalt-saturated felt, two plies of asphalt-coated glass felt , or one layer of asphalt-saturated felt base sheet. Lay vapor retarder at right angles to direction of slope. Install first ply of felt or base sheet as specified herein for the specific deck. Apply second ply of 2-ply vapor retarder system using asphalt at rate of 20 to 35 lbs per 100 square feet, applied within plus or minus 25 degrees F of EVT. Do not heat asphalt above asphalt's FBT or 525 degrees F, whichever is less. Use thermometers to check temperatures during heating and application. Side and end laps shall be completely sealed. Asphalt shall be visible beyond all edges of each ply as it is being installed. Plies shall be laid free of wrinkles, buckles, creases or fishmouths. Workers shall not walk on mopped surfaces when the asphalt is sticky. Press out air bubbles to obtain complete adhesion between surfaces. At walls, eaves and rakes, and other vertical surfaces, the vapor retarder organic felts shall be extended9 inches, or separate organic felt plies shall be extended 9 inches, with not less than

9 inches on the substrate, and the extended portion turned back and mopped in over the top of the insulation. At roof penetrations other than walls, eaves and rakes, and vertical surfaces, the vapor retarder or separate plies shall be extended 9 inches to form a lap which shall later be folded back over the edge of the insulation. Asphalt roof cement shall be used under the vapor retarder for at least 9 inches from walls, eaves, rakes and other penetrations.

3.2.1 Vapor Retarder on Poured Concrete Decks

Solidly mop primed substrate with asphalt at rate of 20 to 35 lbs per 100 square feet before installing vapor retarder. Lay first ply of 2 ply system with each sheet lapping 19 inches over the preceding sheet. Lap ends not less than 4 inches. Stagger laps a minimum of 12 inches.

3.2.2 Over Concrete Decks and First Layer of Insulation on Steel Decks

The 2-ply vapor retarder shall be applied as specified above except that venting inorganic base sheet shall be deleted.

3.3 INSTALLATION OF VENTILATING FELT

Apply ventilating felt in accordance with manufacturer's printed instructions. Extend over roof cants, up vertical surfaces and terminate under cap flashing; at roof edges terminate under outside edge of perimeter edge nailers or under gravel stop fascia.

3.4 INSULATION INSTALLATION

Apply insulation in two layers with staggered joints when total required thickness of insulation exceeds 1/2 inch. Lay insulation so that continuous longitudinal joints are perpendicular to direction of felts for the built-up roofing, as specified in Section 07 52 00 MODIFIED BITUMINOUS MEMBRANE, and end joints of each course are staggered with those of adjoining courses. When using multiple layers of insulation, joints of each succeeding layer shall be parallel and offset in both directions with respect to layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface.

3.4.1 Installation Using Asphalt

Firmly embed each layer in solid asphalt mopping; mop only sufficient area to provide complete embedment of one board at a time. Provide 20 to 35 lbs of asphalt per 100 square feet of roof deck for each layer of insulation. Apply asphalt when temperature is within plus or minus 25 degrees F of EVT. Do not heat asphalt above asphalt's FBT or 525 degrees F, whichever is less, for longer than 4 consecutive hours. Use thermometers to check temperatures during heating and application.

3.4.2 Installation Using Only Mechanical Fasteners

Secure total thickness of insulation with penetrating type fasteners.

3.4.3 Special Precautions for Installation of Foam Insulation

3.4.3.1 Polyisocyanurate Insulation

Where polyisocyanurate foam board insulation is provided, install 1/2 inch thick wood fiberboard, glass mat gypsum roof board, or 3/4 inch thick

expanded perlite board insulation over top surface of foam board insulation. Stagger joints of insulation with respect to foam board insulation below.

3.5 PROTECTION

3.5.1 Protection of Applied Insulation

Completely cover each day's installation of insulation with the finished roofing specified on same day. Do not permit phased construction. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing are applied. Do not permit storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces. Exposed edges of the insulation shall be protected by cutoffs at the end of each work day or whenever precipitation is imminent. Cutoffs shall be 2 layers of bituminous-saturated felt set in plastic bituminous cement set in roof cement. Fill all profile voids in cut-offs to prevent entrapping of moisture into the area below the membrane. Cutoffs shall be removed when work is resumed.

3.5.2 Damaged Work and Materials

Restore work and materials that become damaged during construction to original condition or replace with new materials.

3.6 INSPECTION

The Contractor shall establish and maintain an inspection procedure to assure compliance of the installed roof insulation with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Quality control shall include, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of insulation workers; start and end time of work.

b. Verification of certification, listing or label compliance with FM P9513.

c. Verification of proper storage and handling of insulation and vapor retarder materials before, during, and after installation.

d. Inspection of vapor retarder application, including edge envelopes and mechanical fastening.

e. Inspection of mechanical fasteners; type, number, length, and spacing.

f. Coordination with other materials, cants, sleepers, and nailing strips.

g. Inspection of insulation joint orientation and laps between layers, joint width and bearing of edges of insulation on deck.

h. Installation of cutoffs and proper joining of work on subsequent days.

i. Continuation of complete roofing system installation to cover insulation installed same day.

-- End of Section --

SECTION 07 52 00

MODIFIED BITUMINOUS MEMBRANE ROOFING
05/12

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2010; Errata 2011; Supp 1 2013) Minimum Design Loads for Buildings and Other Structures

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.24	(2006) Roofing - Safety Requirements of Low-Sloped Roofs

ASPHALT ROOFING MANUFACTURER'S ASSOCIATION (ARMA)

ARMA 410BUR88	(2001) Manual of Roof Maintenance and Repair
ARMA PMBRG98	(1998) Quality Control Guideline for the Application of Polymer Modified Bitumen Roofing

ASTM INTERNATIONAL (ASTM)

ASTM C1289	(2014) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM C552	(2013) Standard Specification for Cellular Glass Thermal Insulation
ASTM D1863/D1863M	(2005; R 2011; E 2012) Mineral Aggregate Used on Built-Up Roofs
ASTM D312	(2000; R 2006) Standard Specification for Asphalt Used in Roofing
ASTM D4073	(2006; R 2013) Standard Test Method for Tensile-Tear Strength of Bituminous Roofing Membranes
ASTM D41/D41M	(2011) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4263	(1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method

ASTM D4586/D4586M	(2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free
ASTM D6162	(2000a; R 2008) Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
ASTM E108	(2011) Fire Tests of Roof Coverings

FM GLOBAL (FM)

FM 4470	(2010) Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2013) Standard for Safeguarding Construction,Alteration, and Demolition Operations
NFPA 58	(2014; TIA 13-1; TIA 13-2; Errata 13-1; TIA 13-3; Errata 14-2) Liquefied Petroleum Gas Code

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA C3701	(2002) Repair Manual for Low Slope Membrane Roof Systems
NRCA Details	(2003) NRCA Roof Perimeter Flashing Systems Construction Details for Class 1 Roof Construction
NRCA RoofMan	(2011 thru 2014) The NRCA Roofing Manual

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2012) Architectural Sheet Metal Manual, 7th Edition

SINGLE PLY ROOFING INDUSTRY (SPRI)

ANSI/SPRI/FM 4435/ES-1	(2011) Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

UNDERWRITERS LABORATORIES (UL)

UL 790	(2004; Reprint Jul 2013) Standard Test Methods for Fire Tests of Roof Coverings
UL RMSD	(2012) Roofing Materials and Systems

Directory

1.2 DESCRIPTION OF ROOF MEMBRANE SYSTEM

Minimum three-ply SBS modified bitumen roof membrane consisting of modified bitumen base sheet,interply sheet and cap sheet. Modified bitumen roof membrane must be set in hot asphalt.

All work must follow the NRCA RoofMan guidelines and standards stated within this Section.

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

Roof plan; G drawing depicting wind loads and boundaries of enhanced perimeter and corner attachments of roof system components, as applicable

SD-03 Product Data

Modified Bitumen Sheets; G

Asphalt

Fiberglass Felt; G

Primer; G

Modified Bitumen Roof Cement; G

Pre-Manufactured Accessories

Fasteners And Plates; G

Sample Warranty certificate; G

Submit all data required by Section 07 22 00 ROOF AND DECK INSULATION, together with requirements of this section. Include in data written acceptance by the roof membrane manufacturer of the products and accessories provided. Products must be as listed in the applicable wind uplift and fire rating classification listings, unless approved otherwise by the Contracting Officer.

SD-05 Design Data

Wind Uplift Calculations; G

Provide Engineering calculations, signed, sealed, and dated by a qualified Engineer validating the wind resistance per ASCE 7, ASTM D4073, and ANSI/SPRI/FM 4435/ES-1 of non-rated roof system.

SD-07 Certificates

Provide evidence that products used within this specification are manufactured in the United States.

Qualification of Manufacturer

Certify that the manufacturer of the modified bitumen membrane meets requirements specified under paragraph entitled "Qualification of Manufacturer."

Qualification of Applicator

Certify that the applicator meets requirements specified under paragraph entitled "Qualification of Applicator."

Wind Uplift Resistance; G classification, as applicable

Fire Resistance classification; G

Submit the roof system assembly wind uplift and fire rating classification listings.

SD-08 Manufacturer's Instructions

Modified Bitumen Membrane Application; G

Flashing; G

Temperature Limitations for Asphalt

Primer

Fasteners

Cold Weather Installation ; 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

Warranty

Information Card

Instructions To Personnel

Include copies of Material Safety Data Sheets for maintenance/repair materials.

Submit 20 year "No-Dollar-Limit" warranty for labor and materials.

1.4 QUALITY ASSURANCE

1.4.1 Qualification of Manufacturer

Modified bitumen sheet roofing system manufacturer must have a minimum of 5 years experience in manufacturing modified bitumen roofing products.

1.4.2 Qualification of Applicator

Roofing system applicator must be approved, authorized, or licensed in writing by the modified bitumen sheet roofing system manufacturer and have a minimum of five years experience as an approved, authorized, or licensed applicator with that manufacturer and be approved at a level capable of providing the specified warranty. The applicator must supply the names, locations and client contact information of five projects of similar size and scope that the applicator has constructed using the manufacturer's roofing products submitted for this project within the previous three years.

1.4.3 Fire Resistance

Complete roof covering assembly must:

a. Be Class A rated in accordance with ASTM E108, FM 4470, or UL 790; and

b. Be listed as part of Fire-Classified roof deck construction in UL RMSD, or Class I roof deck construction in FM APP GUIDE.

FM or UL approved components of the roof covering assembly must bear the appropriate FM or UL label.

1.4.4 Wind Uplift Resistance

The complete roof system assembly shall be rated and installed to resist wind loads calculated in accordance with ASCE 7 and validated by uplift resistance testing in accordance with Factory Mutual (FM) test procedures. Non-rated systems must not be installed, except as approved by the Contracting Officer. Submit licensed engineer's Wind uplift calculations and substantiating data to validate any non-rated roof system. Base wind uplift measurements on a design wind speed of 100 mph in accordance with ASCE 7and/or other applicable building code requirements.

1.4.5 Preroofing Conference

After approval of submittals and before performing roofing and insulation system installation work, hold a preroofing conference to review the following:

a. Drawings, including Roof Plan, specifications and submittals related to the roof work

Field inspection and verification of all existing conditions, including all fire safety issues, existing structure, and existing materials, including concealed combustibles, which may require additional protection during installation.

b. Roof system components installation

c. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the roof structure, and roofing substrate,

the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representatives to roof manufacturer

d. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing

e. Quality control, (ARMA PMBRG98) plan for the roof system installation

f. Safety requirements

Coordinate preroofing conference scheduling with the Contracting Officer. The conference must be attended by the Contractor, the Contracting Officer's designated personnel, and personnel directly responsible for the installation of roofing and insulation, flashing and sheet metal work, electrical work, other trades interfacing with the roof work, designated safety personnel trained to enforce and comply with ASSE/SAFE A10.24, Fire Marshall, and representative of the roofing materials manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials in manufacturers' original unopened containers and rolls with labels intact and legible. Mark and remove wet or damaged materials from the site. Where materials are covered by a referenced specification, the container must bear the specification number, type, and class, as applicable. Deliver materials in sufficient quantity to allow work to proceed without interruption.

1.5.2 Storage

Protect materials against moisture absorption and contamination or other damage. Avoid crushing or crinkling of roll materials. Store roll materials on end on clean raised platforms or pallets one level high in dry locations with adequate ventilation, such as an enclosed building or closed trailer. Do not store roll materials in buildings under construction until concrete, mortar, and plaster work is finished and dry. Maintain roll materials at temperatures above 50 degrees F for 24 hours immediately before application. Do not store materials outdoors unless approved by the Contracting Officer. Completely cover felts stored outdoors, on and off roof, with waterproof canvas protective covering. Do not use polyethylene sheet as a covering. Tie covering securely to pallets to make completely weatherproof. Provide sufficient ventilation to prevent condensation. Do not store more materials on roof than can be installed the same day and remove unused materials at end of each days work. Distribute materials temporarily stored on roof to stay within live load limits of the roof construction.

Maintain a minimum distance of 35 foot for all stored flammable materials, including materials covered with shrink wraps, craft paper and/or tarps from all torch/welding applications.

Immediately remove wet, contaminated or otherwise damaged or unsuitable materials from the site. Damaged materials may be marked by the

Contracting Officer.

1.5.3 Handling

Prevent damage to edges and ends of roll materials. Do not install damaged materials in the work. Select and operate material handling equipment to prevent damage to materials or applied roofing.

1.6 ENVIRONMENTAL REQUIREMENTS

Do not install roofing system when air temperature is below 40 degrees F, during any form of precipitation, including fog, or when there is ice, frost, moisture, or any other visible dampness on the roof deck. Follow manufacturer's printed instructions for Cold Weather Installation.

1.7 HOT-MOPPED ASPHALT APPLIED MODIFIED BITUMEN MEMBRANE SAFETY

1.7.1 Property Protection

Take all precautions necessary to prevent ignition of combustible materials during hot-mopped asphalt application of roofing. Immediately call the fire department if a fire commences. Review all fire safety procedures as outlined at the pre-roofing conference.

Do not store flammable liquids on the roof.

No AsphaltKettles are allowed on roofs. Locate kettles and supply LP-Gas Cylinders safely and secured per NFPA 241 outside of the building's perimeter a minimum of 20 foot from the structure and any combustible materials.

Maintain a minimum separation of 20 foot between LP-Gas Cylinders and kettle. Provide protective fire retardant blanket barrier or shield between any building structure to a minimum height of 8 foot and a clear surround distance of 4 foot if operations force placement of kettle within a distance of 20 foot. Do not obstruct or place kettles or Cylinder storage within 10 foot of exits, means of egress, gates, roadways, entrances. Locate kettles downwind and away from any building air intakes.

Provide a minimum of two portable fully charged 20 pound ABC (dry chemical) fire extinguishers no closer than 5 foot and no further than 25 foot of horizontal travel distance from each kettle at all times while kettle is in operation, in easily accessible and identifiable locations. Also provide a minimum of one multipurpose 2-A:20-B:C portable fire extinguisher on the roof being covered.

Comply with the following safety procedures:

a. Fuel containers, burners, and related appurtenances of roofing equipment in which liquefied petroleum gas is used for heating must comply with the requirements of NFPA 58.

b. Fuel containers having capacities greater than one pound must be located a minimum of 10 foot clear distance from the burner flame.

c. All LP-Gas Cylinders must be clearly labeled "Flammable Gas", and secured to prevent accidental tip-over.

d. Check all pressure regulators and hoses prior to use for proper functioning and integrity.

e. Turn off fuel supply at LP Gas Cylinder when kettle is not in use.

f. Equip all kettles with a functioning temperature measuring device to ensure no heating in excess of 50 degrees F below the flash point.

g. Provide covers, lid, or top which are close fitting, constructed of minimum No.14 manufacturer's gauge steel, and can be gravity closed on all kettles.

h. Clean all roofing mops and rags free of excess asphalt and store safely away from all combustible materials. Store discarded roofing mops and rags in a non-combustible container and remove from site each day.

i. Position all pump lines handling hot asphalt securely and equip all pump lines with a shut-off valve on each with a coupler which may be opened when lines are full. Do not subject pump lines to pressures in excess of safe and recommended NRCA and ARMA working pressures. Station an operator near the equipment to cut off flow and care for other emergencies while conducting heating, pumping and application operations.

j. Asphalt bucket used by roofers or workers in similar trades must be constructed of minimum No. 24 gauge or heavier sheet steel and have a metal bail of no less than 1/4 inch diameter material. The bail is to be fastened to offset ears or equivalent which have been riveted, welded, or otherwise safely and securely attached to the bucket. Soldered bail sockets are prohibited. Position workers and other employees to avoid being struck by bucket or other roofing materials, which may accidentally fall while being hoisted, lowered, or used in the roofing operation. Provide safety barriers and caution signs at all skylights or other roof holes.

k. Do not use flammable liquids with a flash point below 100 degrees F (gasoline and similar products) for cleaning purposes.

Do not use solid fuel or Class I liquids as fuel for roofing asphalt kettles. Provide a minimum of one employee fully knowledgeable of kettle operations and hazards to maintain constant surveillance during kettle operation within a minimum distance of 25 foot of the kettle.

1.7.2 Fire Watch

All personnel on the roof during hot-mopped application must be properly trained to use a fire extinguisher. Provide a fire watch for a minimum of 30 minutes after completion of hot-mopped kettle operations at the end of each work shift. Maintain the fire watch for additional time required to ensure no potential ignition conditions exist. Utilize heat sensing meters to scan for hot spots in the work. Provide a minimum duration fire watch of two hours conducted by personnel properly trained to survey the underside of the roof deck (where possible) and the topside of possible smoldering elements.

Do not leave the rooftop unattended during breaks in work during a work shift. Walk and scan all areas of application checking for hot spots, fumes, or smoldering, especially at wall and curb areas, prior to departure at the end of each work shift. Ensure any and all suspect conditions are

eliminated prior to leaving the site each work shift.

1.7.3 Wind Conditions

Use side shields with all torching operations when winds are occurring to prevent flame distortion of end burners. Use torch machine equipment with bottom shield plate to prevent flame spread on to roof deck and substrate. When high wind gusts are present, notify the safety officer and cease all use of torching equipment until wind conditions lower and authorization from the safety officer to proceed is received.

1.8 SEQUENCING

Coordinate the work with other trades to ensure that components which are to be secured to or stripped into the roofing system are available and that permanent flashing and counter flashing, per NRCA Details, and are installed as the work progresses. Ensure temporary protection measures are in place to preclude moisture intrusion or damage to installed materials. Application of roofing must immediately follow application of insulation as a continuous operation. Coordinate roofing operations with insulation work so that all roof insulation applied each day is covered with roof membrane installation the same day.

1.9 WARRANTY

Provide roof system material and workmanship warranties meeting specified requirements. Provide revision or amendment to standard membrane manufacturer warranty as required to comply with the specified requirements. Minimum manufacturer warranty shall have no dollar limit, cover full system water-tightness, and shall have a minimum duration of 20 years.

1.9.1 Roof Membrane Manufacturer Warranty

Furnish the roof membrane manufacturer's 20-year no dollar limit roof system materials and installation workmanship warranty, including flashing, insulation in compliance with ASTM C1289, and accessories necessary for a watertight roof system construction. Provide warranty directly to the Government and commence warranty effective date at time of Government's acceptance of the roof work. The warranty must state that:

a. If within the warranty period the roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, blisters, splits, tears, delaminates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the roof system assembly and correction of defective workmanship are the responsibility of the roof membrane manufacturer. All costs associated with the repair or replacement work are the responsibility of the roof membrane manufacturer.

b. When the manufacturer or his approved applicator fail to perform the repairs within 72 hours of notification, emergency temporary repairs performed by others does not void the warranty.

c. Upon completion of installation, and acceptance by the Contracting Officer and Roofing System Engineer of Record, the manufacturer must

supply the appropriate warranty to the Owner.

d. Installer must submit a minimum two year warranty to the membrane manufacturer from the date of acceptance, with a copy to the Contracting Officer and Roofing System Engineer of Record.

1.9.2 Roofing System Installer Warranty

The roof system installer must warrant for a period of two years that the roof system, as installed, is free from defects in installation workmanship, to include the roof membrane, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Write the warranty directly to the Government. The roof system installer is responsible for correction of defective workmanship and replacement of damaged or affected materials. The roof system installer is responsible for all costs associated with the repair or replacement work.

1.9.3 Continuance of Warranty

Repair or replacement work, ARMA 410BUR88, NRCA C3701 that becomes necessary within the warranty period and accomplished in a manner so as to restore the integrity of the roof system assembly and validity of the roof membrane manufacturer warranty for the remainder of the manufacturer warranty period.

1.10 CONFORMANCE AND COMPATIBILITY

The entire roofing and flashing system must be in accordance with specified and indicated requirements, including fire and wind resistance (ANSI/SPRI/FM 4435/ES-1) requirements. Work not specifically addressed and any deviation from specified requirements must be in general accordance with recommendations of the NRCA Roofing and Waterproofing Manual, membrane manufacturer published recommendations and details, and compatible with surrounding components and construction. Submit any deviation from specified or indicated requirements to the Contracting Officer for approval prior to installation.

1.11 ELIMINATION, PREVENTION OF FALL HAZARDS

1.11.1 Fall Protection

Follow OSHA requirements with regard to fall protection.

1.12 SUSTAINABILITY REQUIREMENTS

Coordinate with Section 01 33 29 SUSTAINABLE REQUIREMENTS.

1.12.1 Recycled Materials

Contractor shall select materials so that the sum of post-consumer recycled content value plus one-half of post-industrial recycled content value constitutes at least 20 percent of the total materials cost for the project. EPA Comprehensive Procurement Guidelines has a supplier database: http://www.epa.gov/cpg/products/

1.12.2 Local/Regional Materials

Contractor shall select materials so that a minimum of 20 percent (by

dollar value) of materials and products for the project are extracted, harvested, or recovered, as well as manufactured, regionally within a 500 mile radius of the project site.

PART 2 PRODUCTS

2.1 MODIFIED BITUMEN SHEETS AND FIBERGLASS FELT MATERIALS

Furnish a combination of specified materials that comprise the modified bitumen manufacturer's standard system of the number and type of plies specified. Materials provided must be suitable for the service and climatic conditions of the installation. Modified bitumen sheets must be watertight and visually free of pinholes, particles of foreign matter, non-dispersed raw material, factory splices, or other conditions that might affect serviceability. Polymer modifier must comply with ARMA PMBRG98 and be uniformly dispersed throughout the sheet. Edges of sheet must be straight and flat.

a. SBS Base Sheet: ASTM D6162, Type II, Grade S, minimum 80 mils thick.

b. SBS Interply Sheet: ASTM D6162, Type II, Grade S, minimum 80 mils thick.

c. SBS Cap Sheet: ASTM D6162; Type II, Grade S, minimum 145 mils thick, and as required to provide specified fire safety rating.

2.2 BASE FLASHING MEMBRANE

Membrane manufacturer's standard, minimum two-ply modified bitumen membrane flashing system compatible with the roof membrane specified and as recommended in membrane manufacturer's published literature. Flashing membranes must meet or exceed the properties of the material standards specified for the modified bitumen base, interply and cap sheet, except that flashing membrane thickness must be as recommended by the membrane manufacturer.

2.3 ASPHALT

ASTM D312, Type III or IV, in accordance with modified bitumen membrane manufacturer requirements and compatible with the slope conditions of the installation.

2.4 MEMBRANE SURFACING

Provide modified bitumen roof membrane cap sheet with factory-applied granule surfacing of light color as selected from membrane manufacturer's standard colors. Light colored, opaque water-worn gravel aggregate surfacing material conforming to ASTM D1863/D1863M, or other aggregate as recommended by the membrane manufacturer and approved by the Contracting Officer, and applied in flood coat of hot asphalt.

2.5 PRIMER

ASTM D41/D41M, or other primer compatible with the application and as approved in writing by the modified bitumen membrane manufacturer.

2.6 MODIFIED BITUMEN ROOF CEMENT

ASTM D4586/D4586M, Type II for vertical surfaces, Type I for horizontal

surfaces, compatible with the modified bitumen roof membrane and as recommended by the modified bitumen membrane manufacturer.

2.7 FASTENERS AND PLATES

Provide coated, corrosion-resistant fasteners as recommended by the modified bitumen sheet manufacturer's printed instructions and meeting the requirements of FM 4470 and FM APP GUIDE for Class I roof deck construction and the wind uplift resistance specified. For fastening of membrane or felts to wood materials, provide fasteners driven through 1 inch diameter metal discs, or one piece composite fasteners with heads not less than 1 inch in diameter or 1 inch square with rounded or 45 degree tapered corners.

2.7.1 Masonry or Concrete Walls and Vertical Surfaces

Use hardened steel nails or screws with flat heads, diamond shaped points, and mechanically deformed shanks not less than 1 inch long for securing felts, modified bitumen sheets, metal items, and accessories to masonry or concrete walls and vertical surfaces. Use power-driven fastenersonly when approved in writing by the Contracting Officer.

2.7.2 Metal Plates

Provide flat corrosion-resistant round stress plates as recommended by the modified bitumen sheet manufacturer's printed instructions and meeting the requirements of FM 4470; not less than 2 inch in diameter. Form discs to prevent dishing or cupping.

2.8 PRE-MANUFACTURED ACCESSORIES

Pre-manufactured accessories must be manufacturer's standard for intended purpose, compatible with the membrane roof system and approved for use by the modified bitumen membrane manufacturer.

2.9 ROOF INSULATION BELOW MODIFIED BITUMEN MEMBRANE SYSTEM

Insulation must be compatible with the roof membrane, approved by the membrane manufacturer and meeting all the requirements of ASTM C552 as specified in Section 07 22 00 ROOF AND DECK INSULATION.

PART 3 EXECUTION

3.1 EXAMINATION

Ensure that the following conditions exist prior to application of the roofing materials:

a. Surfaces are rigid, clean, dry, smooth, and free from cracks, holes, and sharp changes in elevation. Joints in the substrate are sealed to prevent dripping of bitumen into building or down exterior walls.

b. The plane of the substrate does not vary more than 1/4 inch within an area 10 by 10 foot when checked with a10 foot straight edge placed anywhere on the substrate.

c. Substrate is sloped as indicated to provide positive drainage.

d. Treated wood nailers are in place on non-nailable surfaces, to permit nailing of base flashing.

e. Protect all combustible materials and surfaces which may contain concealed combustible or flammable materials. All fire extinguishing equipment has been placed as specified.

f. Verify all Fire Watch personnel assignments.

g. Treated wood nailers are fastened in place at for securing of membrane, edging strips, attachment flanges of sheet metal, and roof fixtures. Surface-applied nailers are the same thickness as the roof insulation.

h. Insulation boards are installed smoothly and evenly, and are not broken, cracked, or curled. There are no gaps in insulation board joints exceeding 1/4 inch in width. Insulation is being roofed over on the same day the insulation is installed.

i. Roof deck and framing are sloped as indicated to provide positive drainage.

3.2 PREPARATION

3.2.1 Protection of Property

3.2.1.1 Protective Coverings

Install protective coverings at paving and building walls adjacent to kettles prior to starting the work. Lap protective coverings not less than 6 inch, secure against wind, and vent to prevent collection of moisture on covered surfaces. Keep protective coverings in place for the duration of the roofing work.

3.2.1.2 Bitumen Stops

Provide felt bitumen stops or other means to prevent bitumen drippage at roof edges, openings, and vertical projections before hot mopped application of the roofing membrane.

3.2.2 Equipment

3.2.2.1 Flame-Heated Equipment

Do not place flame-heated equipment on roof. Provide and maintain a fire extinguisher adjacent to flame-heated equipment and on the roof.

3.2.2.2 Electric-Heated Equipment

Provide adequate electrical service as required by manufacturer of electrical equipment to ensure against damage to equipment and property and to ensure proper application of roofing materials.

3.2.3 Heating of Asphalt

Break up solid asphalt on a surface free of dirt and debris. Heat asphalt in kettle designed to prevent contact of flame with surfaces in contact with the asphalt. Kettles must have visible working thermometer and thermostatic controls set to the temperature limits specified herein. Keep controls in working order and calibrated. Use immersion thermometer, accurate within a tolerance of plus or minus 1.8 degrees F, to check temperatures of the asphalt frequently. When temperatures exceed maximums

specified, remove asphalt from the site. Do no permit cutting back, adulterating, or fluxing of asphalt.

3.2.3.1 Temperature Limitations for Asphalt

Heat and apply asphalt at the temperatures specified below unless specified otherwise by manufacturer's printed application instructions. Use thermometer to check temperature during heating and application. Have kettle attended constantly during heating process to ensure specified temperatures are maintained. Do not heat asphalt above its finished blowing temperature (FBT). Do not heat asphalt between 500 and 525 degrees F for longer than four consecutive hours. Do not heat asphalt to the flash point (FP). Apply asphalt and embed membrane sheets when temperature of asphalt is within plus or minus 25 degrees F of the equiviscous temperature (EVT) but not less than 400 degrees F. Before heating and application of asphalt refer to the asphalt manufacturer's label or bill of lading for FP, FBT, and EVT of the asphalt used.

3.2.4 Priming of Surfaces

Prime all surfaces to be in contact with adhered membrane materials. Apply primer at the rate of 0.75 gallon per 100 sq. ft. or as recommended by modified bitumen sheet manufacturer's printed instructions to promote adhesion of membrane materials. Allow primer to dry prior to application of membrane materials to primed surface. Avoid flammable primer material conditions in torch applied membrane applications.

3.2.5 Membrane Preparation

Unroll modified bitumen membrane materials and allow to relax a minimum of 30 minutes prior to installation. In cold weather, adhere to membrane manufacturer's additional recommendations for pre-installation membrane handling and preparation. Inspect for damage, pinholes, particles of foreign matter, non-dispersed raw material, factory splices, or other conditions that might affect serviceability. Edges of seams must be straight and flat so that they may be seamed to one another without forming fish mouths or wrinkles. Discard damaged or defective materials.

3.2.6 Substrate Preparation

Apply membrane to clean, dry surfaces only. Do not apply membrane to surfaces that have been wet by rain or frozen precipitation within the previous 12 hours. Provide cleaning and artificial drying with heated blowers or torches as necessary to ensure clean, dry surface prior to membrane application.

3.3 APPLICATION

Apply roofing materials as specified herein unless approved otherwise by the Contracting Officer. Keep roofing materials dry before and during application. Complete application of roofing in a continuous operation. Begin and apply only as much roofing in one day as can be completed that same day. Maintain specified temperatures for asphalt.

3.3.1 Application Method

3.3.1.1 Hot Asphalt Application of Modified Bitumen Membrane

Apply membrane immediately following application of hot asphalt. Apply hot

asphalt within 6 foot of roll. Do not work ahead with asphalt. Asphalt must be completely fluid, with mop temperatures within the asphalt's EVT range, but not less than 400 degrees F, at the instant membrane comes into contact with asphalt. Application of bitumen between layers must be such as to provide full, continuous, uniform coverage and complete contact of hot asphalt with the sheet above and below. Embed sheets in asphalt. As sheets are being rolled into hot asphalt, immediately and thoroughly apply uniform positive pressure by squeegee, roll, or broom to ensure full adhesion and lap seal, eliminate trapped air and to provide tight, smooth laminations. Avoid excessive extrusion of asphalt at lap areas. Control asphalt bleed out to approximately 1 inch maximum.

3.3.2 Fiberglass Felt, Modified Bitumen Base Sheet

Fully adhere base sheets in accordance with membrane manufacturer's printed instructions. Apply sheets in a continuous operation. Apply sheets with side laps at a minimum of 2 inch unless greater side lap is recommended by the manufacturer's standard written application instructions. Provide end laps of not less than 6 inch and staggered a minimum of 36 inch. Apply sheets parallel to the roof slope. Extend base sheets approximately 2 inch above the top of cant strips at vertical surfaces and to the top of cant strips elsewhere. Trim base sheet to a neat fit around vent pipes, roof drains, and other projections through the roof. Application must be free of ridges, wrinkles, and buckles.

3.3.3 Modified Bitumen Membrane Application

Ensure proper sheet alignment prior to installation. Apply membrane layers perpendicular to slope of roof in shingle fashion to shed water. Bucking or backwater laps are prohibited. Fully adhere membrane sheets to underlying substrate materials. Provide minimum 3 inch side laps and minimum 6 inch end laps and as otherwise required by membrane manufacturer. Stagger end laps minimum 36 inch. Offset side laps between membrane layers a minimum of 12 inch. Offset end laps between membrane layers a minimum of 36 inch. Install all membrane layers the same workday, unless supported otherwise by roof membrane manufacturer application instructions and approved by the Contracting Officer. Provide tight smooth laminations of each membrane layer without wrinkles, ridges, buckles, kinks, fishmouths, or voids. Ensure full membrane adhesion and full lap seals. Rework to seal any open laps prior to application of subsequent membrane layers. The completed membrane application must be free of surface abrasions, air pockets, blisters, ridges, wrinkles, buckles, kinks, fishmouths, voids, or open seams.

3.3.3.1 Cap Sheet Installation

Underlying applied membrane must be inspected and repaired free of damage, holes, puncture, gouges, abrasions, and any other defects, and free of moisture, loose materials, debris, sediments, dust, and any other conditions required by the membrane manufacturer prior to cap sheet installation. Do not apply cap sheet if rain or frozen precipitation has occurred within the previous 24 hours. Align cap membrane and apply by the specified method with the proper side and end lap widths. Set cap sheet in hot asphalt as recommended by the modified bitumen membrane manufacturer. Cut at a 45 degree angle across selvage edge of cap membrane to be overlapped in end lap areas prior to applying overlapping cap membrane. Apply matching granules in any areas of bitumen bleed out while the asphalt is still hot. Minimize traffic on newly installed cap sheet membrane.

3.3.4 Membrane Flashing

Apply two-ply modified bitumen strip flashing and sheet flashing in the angles formed where the roof deck abuts walls, curbs, ventilators, pipes, and other vertical surfaces, and where necessary to make the work watertight. Apply membrane flashing in accordance with the roof membrane manufacturers printed instructions and as specified. Cut at a 45 degree angle across terminating end lap area of cap membrane prior to applying adjacent overlapping cap membrane. Press flashing into place to ensure full adhesion and avoid bridging. Ensure full lap seal in all lap areas. Mechanically fasten top edge of modified bituminous base flashing 150 mm (6 inches) on center through minimum 1 inch diameter tin caps with fasteners of sufficient length to embed minimum one inch into attachment substrate. Apply matching granules in any areas of asphalt bleed out while the asphalt is still hot. Apply membrane liner over top of exposed nailers and blocking and to overlap top edge of base flashing installation at curbs, parapet walls, expansion joints and as otherwise indicated to serve as waterproof lining under sheet metal flashing components. Metal flashing per SMACNA 1793 guidelines and standards is specified under Section 07 60 00 FLASHING AND SHEET METAL. Do not set metal flashing in hot asphalt.

3.3.4.1 Membrane Strip Flashing

Set primed flanges of metal flashing in full bed of modified bituminous cement material and securely fasten through to attachment substrate. Strip-in with membrane flashing so that strip extends not less than 4 inch beyond outer edge of flange. Where multiple membrane stripping plies are installed, extend each additional stripping ply minimum 4 inch beyond edge of previous ply.

3.3.4.2 Lightning Protection

Flash and attach lightning protection system components to the roof membrane in a manner acceptable to the roof membrane manufacturer.

3.3.5 Correction of Deficiencies

Where any form of deficiency is found, additional measures will be taken as deemed necessary by the Contracting Officer to determine the extent of the deficiency and corrective actions must be performed as directed by the Contracting Officer.

3.3.6 Clean Up

Remove debris, scraps, containers and other rubbish and trash resulting from installation of the roofing system from job site each day.

3.4 CORRECTION OF DEFICIENCIES

Where any form of deficiency is found, additional measures must be taken as deemed necessary by the Contracting Officer to determine the extent of the deficiency and corrective actions must be as directed by the Contracting Officer.

3.5 PROTECTION OF APPLIED ROOFING

At the end of the day's work and when precipitation is imminent, protect applied modified bitumen roofing system from water intrusion.

3.5.1 Water Cutoffs

Straighten insulation line using loose-laid cut insulation sheets and seal the terminated edge of modified bitumen roofing system in an effective manner. Seal off flutes in metal decking along the cutoff edge. Remove the water cut-offs to expose the insulation when resuming work, and remove the insulation sheets used for fill-in.

3.6 FIELD QUALITY CONTROL

Perform field tests in the presence of the Contracting Officer. Notify the Contracting Officer one day before performing tests.

3.6.1 Test for Surface Dryness

Before application of membrane sheets and starting work on the area to be roofed, perform test for surface dryness in accordance with the following:

a. Foaming: When poured on the surface to which membrane materials are to be applied, one pint of asphalt when heated in the range of 350 to 400 degrees F, must not foam upon contact.

b. Strippability: On cementitious substrate surfaces, after asphalt used in the foaming test application has cooled to ambient temperatures, test coating for adherence. Should a portion of the sample be readily stripped clean from the surface, do not consider the surface to be dry and do not start application. Should rain occur during application, stop work and do not resume until surface has been tested by the method above and found dry.

c. Prior to installing any roof system on a concrete deck, conduct a test per ASTM D4263. The deck is acceptable for roof system application when there is no visible moisture on underside of plastic sheet after 24 hours.

3.6.2 Construction Monitoring

During progress of the roof work, Contractor must make visual inspections as necessary to ensure compliance with specified parameters. Additionally, verify the following:

a. Materials comply with the specified requirements.

b. Materials are not installed in adverse weather conditions.

All materials are properly stored, handled and protected from moisture or other damages.

c. Equipment is in working order. Metering devices are accurate.

d. Substrates are in acceptable condition, in compliance with specification, prior to application of subsequent materials.

(1) Nailers and blocking are provided where and as needed.

Insulation substrate is smooth, properly secured to its substrate, and without excessive gaps prior to membrane application.

(2) The proper number, type, and spacing of fasteners are installed.

Membrane heating, hot mopping, or adhesive application is provided uniformly and as necessary to ensure full adhesion of roll materials. Asphalt is heated and applied within the specified temperature range.

The proper number and types of plies are installed, with the specified overlaps.

Applied membrane surface is inspected, cleaned, dry, and repaired as necessary prior to cap sheet installation.

(3) Lap areas of all plies are completely sealed.

Membrane is fully adhered without ridges, wrinkles, kinks, fishmouths, or other voids or delaminations.

Installer adheres to specified and detailed application parameters.

Associated flashing and sheet metal are installed in a timely manner in accord with the specified requirements.

Temporary protection measures are in place at the end of each work shift.

3.7 INSTRUCTIONS TO PERSONNEL

Furnish written and verbal instructions on proper maintenance procedures to designated Government personnel. Furnish instructions by a competent representative of the modified bitumen membrane manufacturer and include a minimum of 4 hours on maintenance and emergency repair of the membrane. Include a demonstration of membrane repair, and give sources of required special tools. Furnish information on safety requirements during maintenance and emergency repair operations.

3.8 INFORMATION CARD

For each roof, furnish a typewritten information card for facility Records and a card laminated in plastic and framed for interior display at roof access point, or a photoengraved 0.039 inch thick aluminum card for exterior display. Card must be 8 1/2 by 11 inch minimum. Information card must identify facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, membrane, number of plies, method of application, manufacturer, insulation and cover board system and thickness; presence of tapered insulation for primary drainage, presence of vapor retarder; date of completion; installing contractor identification and contact information; membrane manufacturer warranty expiration, warranty reference number, and contact information. The card must be a minimum size of 8 1/2 by 11 inch. Install card at roof top or access location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

-- End of Section --

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.

ASTM INTERNATIONAL (ASTM)

ASTM A167	(1999; R 2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM B32	(2008) Standard Specification for Solder Metal
ASTM D226/D226M	(2009) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D41/D41M	(2011) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4586/D4586M	(2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free

1.2 GENERAL REQUIREMENTS

Finished sheet metalwork will form a weathertight construction without waves, warps, buckles, fastening stresses or distortion, which allows for expansion and contraction. Sheet metal mechanic is responsible for cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades. Coordinate installation of sheet metal items used in conjunction with roofing with roofing work to permit continuous roofing operations.

1.3 SUBMITTALS

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

Gutters; G
Downspouts; G
Gravel stops and fascias; G
Flashing at roof penetrations; G
Drip edge; G

SD-11 Closeout Submittals

Submit for sheet metal work in accordance with paragraph entitled "Field Quality Control."

1.4 DELIVERY, HANDLING, AND STORAGE

Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until immediately before installation.

PART 2 PRODUCTS

2.1 MATERIALS

Do not use lead, lead-coated metal, or galvanized steel.

Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation. Provide accessories made of the same or compatible materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this section. Provide sheet metal items with mill finish unless specified otherwise. Where more than one material is listed for a particular item in Table I, each is acceptable and may be used except as follows:

2.1.1 Exposed Sheet Metal Items

Must be of the same material. Consider the following as exposed sheet metal: gutters, including hangers; downspouts; gravel stops and fascias and related accessories.

2.1.2 Stainless Steel

ASTM A167, Type 302 or 304, 2D Finish, fully annealed, dead-soft temper.

2.1.3 Solder

ASTM B32, 95-5 tin-antimony.

2.1.4 Bituminous Plastic Cement

ASTM D4586/D4586M, Type I.

2.1.5 Roofing Felt

ASTM D226/D226M Type I.

2.1.6 Asphalt Primer

ASTM D41/D41M.

2.1.7 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 Nailing

Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inch. Confine nailing of flashing to one edge only. Space nails evenly not over 3 inch on center and approximately 1/2 inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for sleepers and nailing strips required to secure the work.

3.1.2 Cleats

Provide cleats for sheet metal 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 and of the same material and thickness as the sheet metal being installed. Secure one end of the cleat with two nails and the cleat folded back over the nailheads. Lock the other end into the seam. Where the fastening is to be made to concrete or masonry, use screws and drive in expansion shields set in concrete or masonry. Pretin cleats for soldered seams.

3.1.3 Bolts, Rivets, and Screws

Install bolts, rivets, and 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 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.

3.1.5 Gravel Stops and Fascias

Prefabricate in the shapes and sizes indicated and in lengths not less that 8 feet. Extend flange at least 4 inch onto roofing. Provide prefabricated, mitered corners internal and external corners. Install gravel stops and fascias after all plies of the roofing membrane have been applied, but before the flood coat of bitumen is applied. Prime roof flange of gravel stops and fascias on both sides with an asphalt primer. After primer has dried, set flange on roofing membrane and strip-in.Nail flange securely to wood nailer with large-head, barbed-shank roofing nails 1.5 inch long spaced not more than 3 inch on center, in two staggered rows.

3.1.5.1 Edge Strip

Hook the lower edge of fascias at least 3/4 inch over a continuous strip of the same material bent outward at an angle not more than 45 degrees to form a drip. Nail hook strip to a wood nailer at 6 inchmaximum on center. Where fastening is made to concrete or masonry, use screws spaced 12 inch on center driven in expansion shields set in the concrete or masonry. Where horizontal wood nailers are slotted to provide for insulation venting, install strips to prevent obstruction of vent slots. Where necessary, install strips over 1/16 inch thick compatible spacer or washers.

3.1.5.2 Joints

Leave open the section ends of gravel stops and fascias 1/4 inch and backed with a formed flashing plate, mechanically fastened in place and lapping each section end a minimum of 4 inch set laps in plastic cement. Face nailing will not be permitted. Install prefabricated aluminum gravel stops and fascias in accordance with the manufacturer's printed instructions and details.

3.1.6 Metal Drip Edge

Provide a metal drip edge, designed to allow water run-off to drip free of underlying construction, at eaves and rakes prior to the application of roofing shingles. Apply directly on the wood deck at the eaves and over the underlay along the rakes. Extend back from the edge of the deck not more than 3 inch and secure with compatible nails spaced not more than 10 inch on center along upper edge.

3.1.7 Gutters

The hung type of shape indicated and supported on underside by brackets that permit free thermal movement of the gutter. Provide gutters in sizes indicated complete with mitered corners, end caps, outlets, brackets, and other accessories necessary for installation. Bead with hemmed edge or reinforce the outer edge of gutter with a stiffening bar not less than 3/4 by 3/16 inch of material compatible with gutter. Fabricate gutters in sections not less than 8 feet. Lap the sections a minimum of one inch in the direction of flow or provide with concealed splice plate 6 inch minimum. Join the gutters, other than aluminum, by riveted and soldered joints. Install gutters below slope line of the roof so that snow and ice can slide clear. Support gutters on adjustable hangers spaced not more than 30 inch on center. Adjust gutters to slope uniformly to outlets, with high points occurring midway between outlets. Fabricate hangers and fastenings from metals.

3.1.8 Downspouts

Space supports for downspouts according to the manufacturer's recommendation for the masonry substrate. Types, shapes and sizes are indicated. Provide complete including elbows and offsets. Provide downspouts in approximately 10 foot lengths. Provide end joints to telescope not less than 1/2 inch and lock longitudinal joints. Provide gutter outlets with wire ball strainers for each outlet. Provide strainers to fit tightly into outlets and be of the same material used for gutters. Keep downspouts not less than one inch away from walls. Fasten to the walls at top, bottom, and at an intermediate point not to exceed 5 feet on center with leader straps or concealed rack-and-pin type fasteners. Form

straps and fasteners of metal compatible with the downspouts.

3.1.8.1 Terminations

Neatly fit into the drainage connection the downspouts terminating in drainage lines and fill the joints with a portland cement mortar cap sloped away from the downspout. Provide downspouts terminating in splash blocks with elbow-type fittings. Provide splash pans as specified.

3.1.9 Flashing at Roof Penetrations

Provide metal flashing for all pipes, ducts, and conduits projecting through the roof surface and for equipment supports, guy wire anchors, and similar items supported by or attached to the roof deck.

3.2 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 SHEET METAL SCHEDULE

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

Sheet Metal Items	Copper kilograms per square foot	Aluminum, inch	Stainless Steel, inch	Terne-Coated Stainless Steel, inch	Zinc-Coated Steel, U.S. Std. Gage
Downspouts and leaders	16	.032	.015	.015	24
Downspout clips and anchors	-	.040 clip .125 anchor	-	-	-
Downspout straps, 2-inch	48 (a)	.060	.050	-	-
Gravel stops and fascias:					
Edge strip	24	.050	.025	-	-
Gutters:					

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

Sheet Metal Items	Copper kilograms per square foot	Aluminum, inch	Stainless Steel, inch	Terne-Coated Stainless Steel, inch	Zinc-Coated Steel, U.S. Std. Gage
Gutter section	16	.032	.015	.015	24
Hangers, dimensions	1 inch by 1/8 inch (a)	1 inch by .080 inch (c)	1 inch by . inch	-	-
Joint Cover plates (See Table II)	16	.032	.015	.015	24

-- End of Section --

SECTION 07 84 00

FIRESTOPPING
05/10

PART 1 GENERAL

1.1 SUMMARY

Furnish and install tested and listed firestopping systems, combination of materials, or devices to form an effective barrier against the spread of flame, smoke and gases, and maintain the integrity of fire resistance rated walls, partitions, floors, and ceiling-floor assemblies, including through-penetrations and construction joints and gaps.

a. Through-penetrations include the annular space around pipes, tubes, conduit, wires, cables and vents.

b. Construction joints include those used to accommodate expansion, contraction, wind, or seismic movement; firestopping material shall not interfere with the required movement of the joint.

Gaps requiring firestopping include gaps between the curtain wall and the floor slab and between the top of the fire-rated walls and the roof or floor deck above and at the intersection of shaft assemblies and adjoining fire resistance rated assemblies.

1.2 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E119	(2014) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E1399/E1399M	(1997; E 2013;R 2013) Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems
ASTM E1966	(2015) Fire-Resistive Joint Systems
ASTM E2174	(2014b) Standard Practice for On-Site Inspection of Installed Fire Stops
ASTM E2307	(2015a) Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus
ASTM E2393	(2010a) Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

ASTM E699	(2009) Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components
ASTM E814	(2013a) Standard Test Method for Fire Tests of Through-Penetration Fire Stops
ASTM E84	(2015a) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM 4991	(2013) Approval of Firestop Contractors
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

UNDERWRITERS LABORATORIES (UL)

UL 1479	(2015) Fire Tests of Through-Penetration Firestops
UL 2079	(2004; Reprint Dec 2014) Tests for Fire Resistance of Building Joint Systems
UL 723	(2008; Reprint Aug 2013) Test for Surface Burning Characteristics of Building Materials
UL Fire Resistance	(2014) Fire Resistance Directory

1.3 SEQUENCING

Coordinate the specified work with other trades. Apply firestopping materials, at penetrations of pipes and ducts, prior to insulating, unless insulation meets requirements specified for firestopping. Apply firestopping materials. at building joints and construction gaps, prior to completion of enclosing walls or assemblies. Cast-in-place firestop devices shall be located and installed in place before concrete placement. Pipe, conduit or cable bundles shall be installed through cast-in-place device after concrete placement but before area is concealed or made inaccessible. Firestop material shall be inspected and approved prior to final completion and enclosing of any assemblies that may conceal installed firestop.

1.4 SUBMITTALS

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 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Firestopping System; G

SD-03 Product Data

Firestopping Materials; G

SD-06 Test Reports

Inspection; G

SD-07 Certificates

Inspector Qualifications
Firestopping Materials
Installer Qualifications; G

1.5 QUALITY ASSURANCE

1.5.1 Installer

Engage an experienced Installer who is:

a. FM Research approved in accordance with FM 4991, operating as a UL Certified Firestop Contractor, or

b. Certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's products in accordance with specified requirements. Submit documentation of this experience. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer installer qualifications on the buyer. The Installer shall have been trained by a direct representative of the manufacturer (not distributor or agent) in the proper selection and installation procedures. The installer shall obtain from the manufacturer and submit written certification of training, and retain proof of certification for duration of firestop installation.

1.5.2 Inspector Qualifications

The inspector shall meet the criteria contained in ASTM E699 for agencies involved in quality assurance and shall have a minimum of two years experience in construction field inspections of firestopping systems, products, and assemblies. The inspector shall be completely independent of, and divested from, the installer, the manufacturer, and the supplier of any material or item being inspected. The inspector shall not be a competitor of the installer, the contractor, the manufacturer, or supplier of any material or item being inspected. Include in the qualifications submittal a notarized statement assuring compliance with the requirements stated herein.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, protected from damage and exposure to elements and temperatures in accordance with manufacturer requirements. Remove damaged or deteriorated materials from the site. Use materials within their indicated shelf life.

PART 2 PRODUCTS

2.1 FIRESTOPPING SYSTEM

Submit detail drawings including manufacturer's descriptive data, typical details conforming to UL Fire Resistance or other details certified by another nationally recognized testing laboratory, installation instructions or UL listing details for a firestopping assembly in lieu of fire-test data or report. For those firestop applications for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment, derived from similar UL system designs or other tests, shall be submitted for review and approval prior to installation. Submittal must indicate the firestopping material to be provided for each type of application. When more than a total of 5 penetrations and/or construction joints are to receive firestopping, provide drawings that indicate location, "F" "T" and "L" ratings, and type of application.

Also, submit a written report indicating locations of and types of penetrations and types of firstopping used at each location; record type by UL list printed numbers.

2.2 FIRESTOPPING MATERIALS

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

2.2.1 Fire Hazard Classification

Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E84 or UL 723. Material shall be an approved firestopping material as listed in UL Fire Resistance or by a nationally recognized testing laboratory.

2.2.2 Toxicity

Material shall be nontoxic and carcinogen free to humans at all stages of application or during fire conditions and shall not contain hazardous chemicals or require harmful chemicals to clean material or equipment.

2.2.3 Fire Resistance Rating

Firestop systems shall be UL Fire Resistance listed or FM APP GUIDE approved with "F" rating at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected. Where required, firestop systems shall also have "T" rating at least equal to the fire-rated floor in which the openings are to be protected.

2.2.3.1 Through-Penetrations

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

2.2.3.1.1 Penetrations of Fire Resistance Rated Walls and Partitions

F Rating = 1 hour.

2.2.3.1.2 Penetrations of Fire Resistance Rated Floors, Floor-Ceiling Assemblies and the Ceiling Membrane of Roof-Ceiling Assemblies

F Rating = 1 hour, T Rating = 1 hour.

2.2.3.1.3 Penetrations of Fire and Smoke Resistance Rated Walls, Floors, Floor-Ceiling Assemblies, and the ceiling membrane of Roof-Ceiling Assemblies

F Rating = 1 hour, T Rating = 1 hour and L Rating = <10 cfm/sf.

2.2.3.2 Construction Joints and Gaps

Fire resistance ratings of construction joints, as described in paragraph SYSTEM DESCRIPTION, and gaps such as those between floor slabs and curtain walls shall be the same as the construction in which they occur. Construction joints and gaps shall be provided with firestopping materials and systems that have been tested in accordance with ASTM E119, ASTM E1966 or UL 2079 to meet the required fire resistance rating. Curtain wall joints shall be provided with firestopping materials and systems that have been tested in accordance with ASTM E2307 to meet the required fire resistance rating. Systems installed at construction joints shall meet the cycling requirements of ASTM E1399/E1399M or UL 2079. All joints at the intersection of the top of a fire resistance rated wall and the underside of a fire-rated floor, floor ceiling, or roof ceiling assembly shall provide a minimum class II movement capability.

2.2.4 Material Certification

Submit certificates attesting that firestopping material complies with the specified requirements. For all intumescent firestop materials used in through penetration systems, manufacturer shall provide certification of compliance with UL 1479.

PART 3 EXECUTION

3.1 PREPARATION

Areas to receive firestopping must be free of dirt, grease, oil, or loose materials which may affect the fitting or fire resistance of the firestopping system. For cast-in-place firestop devices, formwork or metal deck to receive device prior to concrete placement must be sound and capable of supporting device. Prepare surfaces as recommended by the manufacturer.

3.2 INSTALLATION

Completely fill void spaces with firestopping material regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping systems for filling floor voids 4 inches or more in any direction must be capable of supporting the same load as the floor is designed to support or be protected by a permanent barrier to prevent loading or traffic in the firestopped area. Install firestopping in accordance with manufacturer's written instructions. Provide tested and listed firestop systems in the following locations, except in floor slabs on grade:

a. Penetrations of duct, conduit, tubing, cable and pipe through floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.

b. Penetrations of vertical shafts such as pipe chases, elevator shafts, and utility chutes.

c. Gaps at the intersection of floor slabs and curtain walls, including inside of hollow curtain walls at the floor slab.

d. Gaps at perimeter of fire-resistance rated walls and partitions, such as between the top of the walls and the bottom of roof decks.

e. Construction joints in floors and fire rated walls and partitions.

f. Other locations where required to maintain fire resistance rating of the construction.

3.2.1 Insulated Pipes and Ducts

Thermal insulation shall be cut and removed where pipes or ducts pass through firestopping, unless insulation meets requirements specified for firestopping. Replace thermal insulation with a material having equal thermal insulating and firestopping characteristics.

3.2.2 Fire Dampers

Install and firestop fire dampers in accordance with Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM. Firestop installed with fire damper must be tested and approved for use in fire damper system. Firestop installed with fire damper must be tested and approved for use in fire damper system.

3.2.3 Data and Communication Cabling

Cabling for data and communication applications shall be sealed with re-enterable firestopping products and devices as indicated.

3.2.3.1 Re-Enterable Devices

Firestopping devices shall be pre-manufactured modular devices, containing built-in self-sealing intumescent inserts. Firestopping devices shall allow for cable moves, additions or changes without the need to remove or replace any firestop materials. Devices must be capable of maintaining the fire resistance rating of the penetrated membrane at 0 percent to 100 percent visual fill of penetrants; while maintaining "L" rating of <10 cfm/sf at 0 percent to 100 percent visual fill.

3.2.3.2 Re-Sealable Products

Provide firestopping pre-manufactured modular products, containing self-sealing intumescent inserts. Firestopping products shall allow for cable moves, additions or changes. Devices shall be capable of maintaining the fire resistance rating of the penetrated membrane at 0 percent to 100 percent visual fill of penetrants.

3.3 INSPECTION

For Navy projects, install one of each type of penetration and have it inspected and accepted by the Naval Facilities Engineering Command, Fire Protection Engineer prior to the installation of the remainder of the penetrations. At this inspection, the manufacturer's technical representative of the firestopping material shall be present. For all projects, the firestopped areas shall not be covered or enclosed until inspection is complete and approved by the Contracting Officer. The inspector must inspect the applications initially to ensure adequate preparations (clean surfaces suitable for application, etc.) and periodically during the work to assure that the completed work has been accomplished according to the manufacturer's written instructions and the specified requirements. Submit written reports indicating locations of and types of penetrations and types of firestopping used at each location; type shall be recorded by UL listed printed numbers.

3.3.1 Inspection Standards

Inspect all firestopping in accordance to ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results to be submitted.

3.3.2 Inspection Reports

Submit inspection report stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

-- End of Section --

SECTION 07 92 00

JOINT SEALANTS
01/07

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C1311	(2010) Standard Specification for Solvent Release Agents
ASTM C509	(2006; R 2011) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C920	(2011) Standard Specification for Elastomeric Joint Sealants
ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D2452	(2003; R 2009) Standard Test Method for Extrudability of Oil- and Resin-Base Caulking Compounds
ASTM D2453	(2003; R 2009) Standard Test Method for Shrinkage and Tenacity of Oil- and Resin-Base Caulking Compounds

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-03 Product Data

Sealants

Primers

Bond breakers

Backstops

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). Provide a copy of the Material Safety Data Sheet for each solvent, primer or sealant material.

SD-07 Certificates

Sealant

Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL CONDITIONS

Apply sealant when the ambient temperature is between 40 and 90 degrees F.

1.4 DELIVERY AND STORAGE

Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, and material designation clearly marked thereon. Label elastomeric sealant containers to identify type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 90 degrees F or less than 0 degrees F.

1.5 QUALITY ASSURANCE

1.5.1 Compatibility with Substrate

Verify that each of the sealants are compatible for use with joint substrates.

1.5.2 Joint Tolerance

Provide joint tolerances in accordance with manufacturer's printed instructions.

1.5.3 Mock-Up

Project personnel is responsible for installing sealants in mock-up prepared by other trades, using materials and techniques approved for use on the project.

1.6 SPECIAL WARRANTY

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

PART 2 PRODUCTS

2.1 SEALANTS

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

2.1.1 Interior Sealant

Provide ASTM C920, Type S or M, Grade NS, Class 12.5, Use NT. Location(s) and color(s) of sealant for the following:

LOCATION	COLOR
a. Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.	To be determined
b. Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.	To be determined
c. Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.	To be determined

2.1.2 Exterior Sealant

For joints in vertical surfaces, provide ASTM C920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T. Provide location(s) and color(s) of sealant as follows:

LOCATION	COLOR
a. Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.	Match adjacent surface color

LOCATION	COLOR
b. Voids where items pass through exterior walls.	Match adjacent surface color
c. Joints between ends of gravel stops, fascias, copings, and adjacent walls.	Match adjacent surface color

2.1.3 Floor Joint Sealant

ASTM C920, Type S or M, Grade P, Class 25, Use T. Provide location(s) and color(s) of sealant as follows:

LOCATION	COLOR
a. Seats of metal thresholds for exterior doors.	As selected
b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.	As selected

2.2 PRIMERS

Provide a nonstaining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

2.3 BOND BREAKERS

Provide the type and consistency recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.4 BACKSTOPS

Provide glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Provide 25 to 33 percent oversized backing for closed cell and 40 to 50 percent oversized backing for open cell material, unless otherwise indicated. Make backstop material compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

2.4.1 Rubber

Conform to ASTM D1056, Type 2, closed cell, Class A, round cross section for cellular rubber sponge backing.

2.4.2 Synthetic Rubber

Conform to ASTM C509, Option I preformed rods or tubes for Synthetic rubber backing.

2.4.3 Neoprene

Conform to ASTM D1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2 for Neoprene backing.

2.4.4 Butyl Rubber Based

Provide Butyl Rubber Based Sealants of single component, solvent release, color as selected, conforming to ASTM C1311.

2.4.5 Silicon Rubber Base

Provide Silicon Rubber Based Sealants of single component, solvent release, color as selected, conforming to ASTM C920.

2.5 CAULKING

Conform to ASTM D2452 and ASTM D2453.

2.6 CLEANING SOLVENTS

Provide type(s) recommended by the sealant manufacturer.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Clean surfaces from dirt frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Remove oil and grease with solvent. Surfaces must be wiped dry with clean cloths. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant. For surface types not listed below, contact sealant manufacturer for specific recommendations.

3.1.1 Steel Surfaces

Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.

3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials by sandblasting or wire brushing. Remove laitance, efflorescence and loose mortar from the joint cavity.

3.2 SEALANT PREPARATION

Do not add liquids, solvents, or powders to the sealant. Mix multicomponent elastomeric sealants in accordance with manufacturer's instructions.

3.3 APPLICATION

3.3.1 Joint Width-To-Depth Ratios

a. Acceptable Ratios:

JOINT WIDTH	JOINT DEPTH	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch	1/2 of width	Equal to width
For wood, concrete, masonry, or stone :		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch to 1/2 inch	1/4 inch	Equal to width
over 1/2 inch to 2 inch	1/2 inch	5/8 inch
Over 2 inch	As recommended by sealant manufacturer	

b. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding is not required on metal surfaces.

3.3.2 Masking Tape

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

3.3.3 Backstops

Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:

a. Where indicated.

b. Where backstop is not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios".

3.3.4 Primer

Immediately prior to application of the sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.

3.3.5 Bond Breaker

Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

3.3.6 Sealants

Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and can not be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's printed instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Make sealant uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified. Apply sealer over the sealant when and as specified by the sealant manufacturer.

3.4 PROTECTION AND CLEANING

3.4.1 Protection

Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

3.4.2 Final Cleaning

Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

a. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding.

b. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent-moistened cloth.

-- End of Section --

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	(2013) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM C578	(2014) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C591	(2013) Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C612	(2014) Mineral Fiber Block and Board Thermal Insulation
ASTM D2863	(2013) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
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

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 111	(2009) Recommended Selection and Usage Guide for Standard Steel Doors, Frames and Accessories
SDI/DOOR 113	(2001; R2006) Standard Practice for Determining the Steady State Thermal Transmittance of Steel Door and Frame Assemblies
SDI/DOOR A250.11	(2001) Recommended Erection Instructions for Steel Frames
SDI/DOOR A250.3	(2007; R 2011) Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and 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

Frames; G

Accessories

Weatherstripping

Show elevations, construction details, metal gages, hardware provisions, method of glazing, and installation details.

Schedule of doors; G

Schedule of frames; G

Submit door and frame locations.

SD-03 Product Data

Doors; G

Frames; G

Accessories

Weatherstripping

Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. When "custom hollow metal doors" are provided in lieu of "standard steel doors," provide additional details and data sufficient for comparison to SDI/DOOR A250.8 requirements.

SD-04 Samples

Factory-applied enamel finish; G

Where colors are not indicated, submit manufacturer's standard colors and patterns for selection.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

PART 2 PRODUCTS

2.1 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 Maximum Duty Doors

SDI/DOOR A250.8, Level 4, physical performance Level A, Model 1 with core construction as required by the manufacturer , of size(s) and design(s) indicated.

2.2 INSULATED STEEL DOOR SYSTEMS

At the option of the Contractor, insulated steel doors and frames may be provided in lieu of Level 1 standard 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 10.0 or more (based on a k value of 0.16); 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.

2.3 ACCESSORIES

2.3.1 Louvers

2.3.1.1 Interior Louvers

SDI/DOOR 111, Louvers shall be stationary type. Detachable moldings on room or non security side of door; on security side of door, moldings to be integral part of louver. Form louver frames of 20 gage steel and louver blades of a minimum 24 gage.

2.3.2 Astragals

For pairs of exterior steel doors which will not have aluminum astragals or removable mullions, as specified in Section 08 71 00 DOOR HARDWARE provide overlapping steel astragals with the doors.

2.4 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.

2.5 STANDARD STEEL FRAMES

SDI/DOOR A250.8, Level 4, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners. Provide steel frames for doors and transoms, unless otherwise indicated.

2.5.1 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.

2.5.2 Mullions and Transom Bars

Mullions and transom bars shall be closed or tubular construction and be a member with heads and jambs butt-welded thereto. Bottom of door mullions shall have adjustable floor anchors and spreader connections.

2.5.3 Stops and Beads

Form stops and beads from 20 gage steel. Provide for glazed and other

openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 12 to 16 inch on center. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

2.5.4 Terminated Stops

Where indicated, terminate interior door frame stops 6 inch above floor.

2.5.5 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

2.5.5.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 7.5 feet in height, provide one additional anchor for each jamb for each additional 2.5 feet or fraction thereof.

a. Masonry: Provide anchors of corrugated or perforated steel straps or 3/16 inch diameter steel wire, adjustable or T-shaped;

b. Stud partitions: Weld or otherwise securely fasten anchors to backs of frames.

2.5.5.2 Floor Anchors

Provide floor anchors drilled for 3/8 inch anchor bolts at bottom of each jamb member.

2.6 WEATHERSTRIPPING

As specified in Section 08 71 00 DOOR HARDWARE.

2.6.1 Integral Gasket

Black synthetic rubber gasket with tabs for factory fitting into factory slotted frames, or extruded neoprene foam gasket made to fit into a continuous groove formed in the frame, may be provided in lieu of head and jamb seals specified in Section 08 71 00 DOOR HARDWARE. Insert gasket in groove after frame is finish painted. Air leakage of weatherstripped doors shall not exceed 0.5 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E283.

2.7 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 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.

2.8 FINISHES

2.8.1 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.

2.8.2 Hot-Dip Zinc-Coated and Factory-Primed Finish

Fabricate exterior doors and frames from hot dipped zinc coated steel, alloyed type, that complies with ASTM A924/A924Mand ASTM A653/A653M. The coating weight shall meet or exceed the minimum requirements for coatings having 0.4 ounces per square foot, total both sides, i.e., A40. Repair damaged zinc-coated surfaces by the application of zinc dust paint. Thoroughly clean and chemically treat to insure maximum paint adhesion. Factory prime as specified in SDI/DOOR A250.8.

2.8.3 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.

2.8.4 Factory-Applied Enamel Finish

Coatings shall meet test procedures and acceptance criteria in accordance with SDI/DOOR A250.3. After factory priming, apply two coats of low-gloss enamel to exposed surfaces. Separately bake or oven dry each coat. Drying time and temperature requirements shall be in accordance with the coating manufacturer's recommendations. Color(s) of finish coat shall be as indicated and shall match approved color sample(s).

2.9 FABRICATION AND WORKMANSHIP

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. Design frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive caulking compound.

2.9.1 Grouted Frames

For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Frames

Set frames in accordance with SDI/DOOR A250.11. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames with mortar. Coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

3.1.2 Doors

Hang doors in accordance with clearances specified in SDI/DOOR A250.8. After erection and glazing, clean and adjust hardware.

3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

-- End of Section --

SECTION 08 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

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.1	(2013) Butts and Hinges
ANSI/BHMA A156.13	(2012) Mortise Locks & Latches Series 1000
ANSI/BHMA A156.16	(2013) 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	(2013) Door Controls - Closers
ANSI/BHMA A156.6	(2010) Architectural Door Trim
ANSI/BHMA A156.7	(2003; R 2009) Template Hinge Dimensions
ANSI/BHMA A156.8	(2010) Door Controls - Overhead Stops and Holders
BHMA A156.22	(2012) Door Gasketing and Edge Seal Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2012; Amendment 1 2012) Life Safety Code

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.8	(2003; R2008) Recommended Specifications for Standard Steel Doors and Frames

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir	(2012) Building Materials Directory

1.2 SUBMITTALS

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

SD-02 Shop Drawings

Hardware schedule; G

Keying system

SD-03 Product Data

Hardware items; G

SD-08 Manufacturer's Instructions

Installation

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.

SD-11 Closeout Submittals

Key Bitting

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 KEY BITTING CHART REQUIREMENTS

Submit key bitting charts to the Contracting Officer prior to completion of the work. Include:

a. Complete listing of all keys (AA1, AA2, etc.).

b. Complete listing of all key cuts (AA1-123456, AA2-123458).

c. Tabulation showing which key fits which door.

d. Copy of floor plan showing doors and door numbers.

e. Listing of 20 percent more key cuts than are presently required in each

master system.

1.5 QUALITY ASSURANCE

1.5.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, and closers of one lock, hinge, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

1.5.2 Key Shop Drawings Coordination Meeting

Prior to the submission of the key shop drawing, the Contracting Officer, Contractor, Door Hardware subcontractor, using Activity and Base Locksmith shall meet to discuss key requirements for the facility.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule. Deliver permanent keys and removable cores to the Contracting Officer, either directly or by certified mail. Deliver construction master keys with the locks.

PART 2 PRODUCTS

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 101 for exit doors, as well as to other requirements indicated, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." Provide the label of Underwriters Laboratories, Inc. for such hardware listed in UL Bld Mat Dir or labeled and listed by another testing laboratory acceptable to the Contracting Officer.

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 Locks and Latches

2.3.2.1 Mortise Locks and Latches

ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2. Provide mortise locks with escutcheons not less than 7 by 2-1/4 inch with a bushing at least 1/4 inch long. Cut escutcheons to suit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges. Install knobs and roses of mortise locks with screwless shanks and no exposed screws.

2.3.3 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 escutcheons, not less than 7 by 2-1/4 inch.

2.3.4 Cylinders and Cores

Provide cylinders and cores for new locks, including locks provided under other sections of this specification. Provide cylinders and cores with seven pin tumblers using the A4 system and F keyway. Provide cylinders from products of one manufacturer, and provide cores from the products of one manufacturer. Rim cylinders, mortise cylinders, and knobs of bored locksets have interchangeable cores which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.

2.3.5 Keying System

Provide a master keying system that is an extension of the existing facility keying system.

Provide sub-master keying system for the building, and keyed to the existing Best removable-core master and grand master keying systems. Key equipment spaces and mechanical rooms separately from the building systems, and keyed alike to the existing Best master and grand master systems for these doors.

2.3.6 Lock Trim

Cast, forged, or heavy wrought construction and commercial plain design.

2.3.6.1 Lever Handles

Provide lever handles in lieu of knobs. Conform to the minimum requirements of ANSI/BHMA A156.13 for mortise locks of lever handles for exit devices. Provide lever handle locks with a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when force in excess of that specified in ANSI/BHMA A156.13 is applied to the lever handle. Provide lever handles return to within 1/2 inch of the door face.

2.3.6.2 Texture

Provide knurled or abrasive coated knobs or lever handles for doors which are accessible to blind persons and which lead to dangerous areas.

2.3.7 Keys

Furnish one file key, one duplicate key, and one working key for each key change and for each master and grand master keying system. Furnish one additional working key for each lock of each keyed-alike group. Furnish 5 construction master keys, and two control keys for removable cores. Furnish a quantity of key blanks equal to 20 percent of the total number of file keys. Stamp each key with appropriate key control symbol and "U.S. property - Do not duplicate." Do not place room number on keys.

2.3.8 Door Bolts

ANSI/BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: ANSI/BHMA A156.3, Type 25.Provide chain operated bolts for operable tramsoms.

2.3.9 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. Provide manufacturer's 10 year warranty.

2.3.9.1 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.

2.3.10 Overhead Holders

ANSI/BHMA A156.8.

2.3.11 Door Protection Plates

ANSI/BHMA A156.6.

2.3.11.1 Sizes of Kick Plates

2 inch less than door width for single doors; one inch less than door width for pairs of doors. Provide 8 inch kick plates for flush doors.

2.3.12 Door Stops and Silencers

ANSI/BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

2.3.13 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.

2.3.14 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, and, for pairs of doors, astragals. Air leakage of weather stripped doors not to exceed 1.25 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E283. Provide weather stripping with one of the following:

2.3.14.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than 0.050 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Provide clear (natural)anodized aluminum.

2.3.14.2 Interlocking Type

Zinc or bronze not less than 0.018 inch thick.

2.3.14.3 Spring Tension Type

Spring bronze or stainless steel not less than 0.008 inch thick.

2.3.15 Rain Drips

Extruded aluminum, not less than 0.08 inch thick, clear anodized. Set drips in sealant and fasten with stainless steel screws.

2.3.15.1 Door Rain Drips

Approximately 1-1/2 inch high by 5/8 inch projection. Align bottom with bottom edge of door.

2.3.16 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). Provide hinges for exterior doors in stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Furnish exit devices in BHMA 626 finish in lieu of BHMA 630 finish. Match exposed parts of concealed closers to lock and door trim. Match hardware finish for aluminum doors to the doors.

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 HARDWARE LOCATIONS

SDI/DOOR A250.8, unless indicated or specified otherwise.

a. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.

b. Mop Plates: Bottom flush with bottom of door.

3.3 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.

3.4 HARDWARE SET ABBREVIATIONS

Manufacturer List

Code	**Name**
BE	Best Access Systems

BM	Bommer Industries
NA	National Guard
SD	Stanley Door Closers
TR	Trimco

Option List

Code	**Name**
N	NON REMOVABLE PIN
TB	THRU-BOLTS
VT	Vandal Trim (630 Finish)
B4E	BEVELED 4 EDGES
C-SUNK HOLES	COUNTER SINKING
1/4-20-2" COMBO	1/4-20 X COMBO MS/ANCHOR (SS)

Finish List

Code	**Name**
AL	Aluminum
626	Satin Chromium Plated
630	Satin Stainless Steel
652	Satin Chromium Plated
689	Aluminum Painted
GREY	Grey
US32D	Stainless Steel, Dull

3.5 HARDWARE SETS:

HW Set #4
Door #7

6 Hinge (A8112)	BB5000 4-1/2x4-1/2	652	BM
1 Flush Bolt (L04081)	3917-12	626	TR
1 Storeroom Lock (F07)	45H-7D14J L/C VT	630	BE
1 Mortise Cylinder	1E-74 Cormax	626	BE
2 Closer (C02021)	CLD-4550 CS	689	SD
2 Kick Plate (J102)	KO050 10" x 1"LDW B4E C-Sunk Holes	630	TR
1 Threshold (J32100)	425 HD 1/4-20-2" COMBO	AL	NA

HW Set #3
Door #3, #4, #8

Description	Model	Finish	Mfgr
10 Hinge (A5111)	BB5006 4-1/2x4-1/2 N	630	BM
2 Flush Bolt (L04081) Note: Install into transom doors	3917-12	626	TR
1 Key Rem mullion (Type 22)	KR822 key removeable	600	PR

Description	Model	Finish	Mfgr
1 Exit Device (Type 1 x 03)	2103 x 1703A pull	630	PR
1 Exit Device (Type 1 x 01)	2101 exit only no trim	630	PR
1 Rim Cylinder	12E-72 Cormax for mullion	626	BE
1 Mortise cylinder	1E-74 Cormax for exit device trim	626	BE
2 Closer (C02021)	CLD-4550 CS	689	SD
2 Kick Plate (J102)	KO050 10" x 1"LDW B4E C-Sunk	630	TR
1 Threshold (J32100)	425 HD 1/4-20-2" COMBO	AL	NA
1 Weatherstripping (R3B164)	700 EN Head and Jambs		NA
2 Door Sweep (R3B434)	200 NA 36"		NA
1 Drip Cap (R3Y976)	16 A 4" ODW		NA
2 "Z" Astragal, NOTE: INSTALL BETWEEN DOOR AND OPERABLE TRANSOM	570 with 1 piece of 5050C seal		NA

HW Set #2
Door #2, #6

3 Hinge (A8112)	BB5000 4-1/2x4-1/2	652	BM
1 Storeroom Lock (F07)	45H-7D14J L/C VT	630	BE
1 Mortise cylinder	1E-74 Cormax	626	BE
1 Closer (C02021)	CLD-4550 CS	689	SD
1 Kick Plate (J102)	KO050 CS 10" x 1"LDW C-Sunk Holes	630	TR
1Threshold (J32100)	425 HD 1/4-20-2" COMBO	AL	NA
3Silencer (L03011)	1229A	GREY	TR

HW Set #1
Door #1, #5, #9

3 Hinge (A5111)	BB5111 4-1/2x4-1/2 N	630	BM
1 Storeroom Lock (F07)	45H-7D14J L/C VT	630	BE
1 Mortise cylinder	1E-74 Cormax	626	BE
1 Closer (C02021)	CLD-4550 CS	689	SD

1 Kick Plate (J102)	KO050 CS 10" x 1"LDW C-Sunk Holes	630	TR
1 Threshold (J32100)	425 HD 1/4-20-2" COMBO	AL	NA
1 Weatherstripping (R3B164)	700 EN Head and Jambs		NA
2 Door Sweep (R3B434)	200 NA 36"		NA
1 Drip Cap (R3Y976)	16 A 4" ODW		NA

-- End of Section --

SECTION 08 91 00

METAL WALL LOUVERS
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.

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA)

AMCA 500-D	(2012) Laboratory Methods of Testing Dampers for Rating
AMCA 511	(2013) Certified Ratings Program for Air Control Devices

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 A167	(1999; R 2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

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

SD-02 Shop Drawings

Wall louvers

SD-03 Product Data

Metal Wall Louvers

SD-04 Samples

Wall louvers; G

Door louvers; G

1.3 DELIVERY, STORAGE, AND PROTECTION

Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and protection against dampness. Louvers shall be free from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

1.4 DETAIL DRAWINGS

Show all information necessary for fabrication and installation of wall louvers. Indicate materials, sizes, thicknesses, fastenings, and profiles.

1.5 COLOR SAMPLES

Colors of finishes for wall louvers and door louvers shall closely approximate colors indicated. Where color is not indicated, submit the manufacturer's standard colors to the Contracting Officer for selection.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Stainless Steel

ASTM A167, Type 302 or 304, with 2B finish.

2.1.2 Cold Rolled Steel Sheet

ASTM A1008/A1008M, Class 1, with matte finish. Use for interior louvers only.

2.2 METAL WALL LOUVERS

Weather resistant type, with insect screens and made to withstand a wind load of not less than 30 pounds per square foot. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. The rating shall show a water penetration of 0.20 or less ounce per square foot of free area at a free velocity of 800 feet per minute.

2.2.1 Extruded Aluminum Louvers

Fabricated of extruded 6063-T5 or -T52 aluminum with a wall thickness of not less than 0.081 inch.

2.2.2 Formed Metal Louvers

Formed of stainless steel sheet not thinner than 16 U.S. gage, or aluminum sheet not less than 0.08 inch thick.

2.2.3 Screens and Frames

For aluminum louvers, provide 1/2 inch square mesh, 14 or 16 gage aluminum or 1/4 inch square mesh, 16 gage aluminum bird screening. For steel louvers, provide 1/2 inch square mesh, 12 or 16 gage zinc-coated steel; 1/2 inch square mesh, 16 gage copper; or 1/4 inch square mesh, 16 gage zinc-coated steel or copper bird screening. Mount screens in removable, rewirable frames of same material and finish as the louvers.

2.3 FASTENERS AND ACCESSORIES

Provide stainless steel screws and fasteners for aluminum louvers and zinc-coated or stainless steel screws and fasteners for steel louvers. Provide other accessories as required for complete and proper installation.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Wall Louvers

Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with manufacturer's recommendations.

3.1.2 Screens and Frames

Attach frames to louvers with screws or bolts.

3.2 PROTECTION FROM CONTACT OF DISSIMILAR MATERIALS

3.2.1 Copper or Copper-Bearing Alloys

Paint copper or copper-bearing alloys in contact with dissimilar metal with heavy-bodied bituminous paint or separate with inert membrane.

3.2.2 Metal

Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

-- End of Section --

SECTION 09 90 00

PAINTS AND COATINGS
05/11

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100	(2001; Supplements 2002-2008) Documentation of the Threshold Limit Values and Biological Exposure Indices

ASTM INTERNATIONAL (ASTM)

ASTM D235	(2002; R 2012) Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
ASTM D4214	(2007) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D4263	(1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D523	(2014) Standard Test Method for Specular Gloss
ASTM D6386	(2010) Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
ASTM F1869	(2011) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

MASTER PAINTERS INSTITUTE (MPI)

MPI 107	(Oct 2009) Rust Inhibitive Primer (Water-Based)
MPI 141	(Oct 2009) Interior High Performance Latex MPI Gloss Level 5
MPI 23	(Oct 2009) Surface Tolerant Metal Primer
MPI 4	(Oct 2009) Interior/Exterior Latex Block Filler
MPI 42	(Oct 2009) Latex Stucco and Masonry Textured Coating

MPI 47	(Oct 2009) Interior Alkyd, Semi-Gloss, MPI Gloss Level 5
MPI 50	(Oct 2009) Interior Latex Primer Sealer
MPI 79	(Oct 2009) Alkyd Anti-Corrosive Metal Primer
MPI 9	(Oct 2009) Exterior Alkyd, Gloss, MPI Gloss Level 6
MPI 94	(Oct 2009) Exterior Alkyd, Semi-Gloss, MPI Gloss Level 5

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SP-01	(2000) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC 7/NACE No.4	(2007; E 2004) Brush-Off Blast Cleaning
SSPC PA 1	(2000; E 2004) Shop, Field, and Maintenance Painting of Steel
SSPC PA Guide 3	(1982; E 1995) A Guide to Safety in Paint Application
SSPC QP 1	(1998; E 2004) Standard Procedure for Evaluating Painting Contractors (Field Application to Complex Industrial Structures)
SSPC SP 1	(1982; E 2004) Solvent Cleaning
SSPC SP 10/NACE No. 2	(2007) Near-White Blast Cleaning
SSPC SP 12/NACE No.5	(2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating
SSPC SP 2	(1982; E 2000; E 2004) Hand Tool Cleaning
SSPC SP 3	(1982; E 2004) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning
SSPC VIS 1	(2002; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC VIS 3	(2004) Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning
SSPC VIS 4/NACE VIS 7	(1998; E 2000; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by

Waterjetting

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008; Errata 2011) Safety and Health Requirements Manual

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 24	(2000) Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313	(Rev D; Notice 1) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

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

29 CFR 1910.1000	Air Contaminants

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

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS SP-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-02 Shop Drawings

SD-03 Product Data

Local/Regional Materials;

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Materials;

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Coating; G

Manufacturer's Technical Data Sheets;

Indicate VOC content.

SD-04 Samples

Color; G

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

SD-07 Certificates

Applicator's qualifications

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

SD-10 Operation and Maintenance Data

Coatings:; G

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

SD-11 Closeout Submittals

Local/Regional Materials;

Materials;

1.3 APPLICATOR'S QUALIFICATIONS

1.3.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of three similar projects within the past three years. List information by individual and include the following:

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

b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of facility owner

Name of individual in facility owner's organization who can be contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

1.3.2 SSPC QP 1 Certification

All contractors and subcontractors that perform surface preparation or coating application shall be certified by the Society for Protective Coatings (formerly Steel Structures Painting Council) (SSPC) to the requirements of SSPC QP 1 prior to contract award, and shall remain certified while accomplishing any surface preparation or coating application. The painting contractors and painting subcontractors must remain so certified for the duration of the project. If a contractor's or subcontractor's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in contractor certification status.

1.4 QUALITY ASSURANCE

1.5 REGULATORY REQUIREMENTS

1.5.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction.

Notify Contracting Officer of any paint specified herein which fails to conform.

1.5.2 Lead Content

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

1.5.3 Chromate Content

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

1.5.4 Asbestos Content

Materials shall not contain asbestos.

1.5.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.5.6 Silica

Abrasive blast media shall not contain free crystalline silica.

1.5.7 Human Carcinogens

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

1.6 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F. Do not store paint, polyurethane, varnish, or wood stain products with materials that have a high capacity to adsorb VOC emissions. Do not store paint, polyurethane, varnish, or wood stain products in occupied spaces.

1.7 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.7.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA Guide 3.

1.7.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.

b. 29 CFR 1910.1000.

c. ACGIH 0100, threshold limit values.

1.8 ENVIRONMENTAL CONDITIONS

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

1.8.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Less than 5 degrees F above dew point;

b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.8.2 Post-Application

Vacate space for as long as possible after application. Wait a minimum of 48 hours before occupying freshly painted rooms. Maintain one of the following ventilation conditions during the curing period, or for 72 hours after application:

a. Supply 100 percent outside air 24 hours a day.

b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30 percent and 60 percent.

c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

1.9 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. See Section 01 33 29 SUSTAINABLE REQUIREMENTS. Paint and coating materials may be locally available.

1.10 SCHEDULING

Allow paint, polyurethane, varnish, and wood stain installations to cure prior to the installation of materials that adsorb VOCs, including.

1.11 COLOR SELECTION

Colors to be selected by the Owner from complete list of Manufacturers colors.

1.12 LOCATION AND SURFACE TYPE TO BE PAINTED

1.12.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.

c. Existing coated surfaces that are damaged during performance of the work.

1.12.1.1 Interior Painting

Includes new surfaces, and existing coated surfaces of the building and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

a. Exposed joists; and

b. Other contiguous surfaces.

1.12.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.

c. Steel to be embedded in concrete.

d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.

e. Hardware, fittings, and other factory finished items.

1.12.3 Mechanical and Electrical Painting

Includes field coating of interior new and existing surfaces.

a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.

(1) Exposed piping, conduit, and ductwork;

(2) Supports, hangers, air grilles, and registers;

(3) Miscellaneous metalwork and insulation coverings.

b. Do not paint the following, unless indicated otherwise:

(1) New zinc-coated, aluminum, and copper surfaces under insulation

(2) New aluminum jacket on piping

(3) New interior ferrous piping under insulation.

1.12.4 Definitions and Abbreviations

1.12.4.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.12.4.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

1.12.4.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendaring, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.12.4.4 DFT or dft

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

1.12.4.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.12.4.6 EPP

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

1.12.4.7 EXT

MPI short term designation for an exterior coating system.

1.12.4.8 INT

MPI short term designation for an interior coating system.

1.12.4.9 micron / microns

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

1.12.4.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.12.4.11 mm

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

1.12.4.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units at 60 degrees	Units at 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

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

1.12.4.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.12.4.14 Paint

See Coating definition.

1.12.4.15 REX

MPI short term designation for an exterior coating system used in

repainting projects or over existing coating systems.

1.12.4.16 RIN

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

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents. Minimum 20 percent post-consumer recycled content for light-colored paints and primers. Minimum 50 percent post-consumer recycled content for dark-colored paints and primers. All consolidated latex paints shall contain a minimum of 100 percent post-consumer recycled content. Comply with applicable regulations regarding toxic and hazardous materials.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, disintegrated coatings, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.2.1 Additional Requirements for Preparation of Surfaces With Existing Coatings

Before application of coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:

a. Test existing finishes for lead before sanding, scraping, or removing. If lead is present, refer to paragraph Toxic Materials.

b. Wipe previously painted surfaces to receive solvent-based coatings, except stucco and similarly rough surfaces clean with a clean, dry cloth saturated with mineral spirits, ASTM D235. Allow surface to

dry. Wiping shall immediately precede the application of the first coat of any coating, unless specified otherwise.

c. Sand existing glossy surfaces to be painted to reduce gloss. Brush, and wipe clean with a damp cloth to remove dust.

d. The requirements specified are minimum. Comply also with the application instructions of the paint manufacturer.

e. Previously painted surfaces specified to be repainted shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.

f. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed.

g. Chalk shall be removed so that when tested in accordance with ASTM D4214, the chalk resistance rating is no less than 8.

h. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas.

i. Edges of chipped paint shall be feather edged and sanded smooth.

j. Rusty metal surfaces shall be cleaned as per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting.

k. New, proposed coatings shall be compatible with existing coatings.

3.2.2 Existing Coated Surfaces with Minor Defects

Sand, spackle, and treat minor defects to render them smooth. Minor defects are defined as scratches, nicks, cracks, gouges, spalls, alligatoring, chalking, and irregularities due to partial peeling of previous coatings. Remove chalking by sanding or blasting so that when tested in accordance with ASTM D4214, the chalk rating is not less than 8.

3.2.3 Removal of Existing Coatings

Remove existing coatings from the following surfaces:

a. Surfaces containing large areas of minor defects;

b. Surfaces containing more than 20 percent peeling area; and

c. Surfaces designated by the Contracting Officer, such as surfaces where rust shows through existing coatings.

3.2.4 Substrate Repair

a. Repair substrate surface damaged during coating removal;

b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and

c. Clean and prime the substrate as specified.

3.3 PREPARATION OF METAL SURFACES

3.3.1 Existing and New Ferrous Surfaces

a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2, SSPC SP 3, SSPC SP 6/NACE No.3, or SSPC SP 10/NACE No. 2. Brush-off blast remaining surface in accordance with SSPC 7/NACE No.4; Water jetting to SSPC SP 12/NACE No.5 WJ-4 may be used to remove loose coating and other loose materials. Use inhibitor as recommended by coating manufacturer to prevent premature rusting. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/NACE No.3 /SSPC SP 12/NACE No.5 WJ-3.

3.3.2 Final Ferrous Surface Condition:

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

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

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

3.3.3 Galvanized Surfaces

a. New or Existing Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. If the galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D6386, Appendix X2, and remove by one of the methods described therein.

b. Galvanized with Slight Coating Deterioration or with Little or No Rusting: Water jetting to SSPC SP 12/NACE No.5 WJ3 to remove loose coating from surfaces with less than 20 percent coating deterioration and no blistering, peeling, or cracking. Use inhibitor as recommended by the coating manufacturer to prevent rusting.

c. Galvanized With Severe Deteriorated Coating or Severe Rusting: Water jet to SSPC SP 12/NACE No.5 WJ3 degree of cleanliness. Spot abrasive blast rusted areas as described for steel in SSPC SP 6/NACE No.3, and waterjet to SSPC SP 12/NACE No.5, WJ3 to remove existing coating.

3.3.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

Surface Cleaning: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

3.4 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

3.4.1 Concrete and Masonry

a. Curing: Concrete, stucco and masonry surfaces shall be allowed to cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.

b. Surface Cleaning: Remove the following deleterious substances.

(1) Dirt, Chalking, Grease, and Oil: Wash new and existing uncoated surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cuphousehold detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water.

(2) Fungus and Mold: Wash new, existing coated, and existing uncoated surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

(3) Paint and Loose Particles: Remove by wire brushing.

(4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

(5) Removal of Existing Coatings: For surfaces to receive textured coating MPI 42, remove existing coatings including soundly adhered coatings if recommended by textured coating manufacturer.

c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.5 APPLICATION

3.5.1 Coating Application

Painting practices shall comply with applicable federal, state and local

laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

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

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

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

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

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

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

3.5.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.5.3 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.5.4 Coating Systems

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

Table

Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table
Division 4. Interior Concrete Masonry Units Paint Table
Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table

b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.

c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.

d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:

(1) One coat of primer.

(2) One coat of undercoat or intermediate coat.

(3) One topcoat to match adjacent surfaces.

e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

3.6 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.

d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.

e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.7 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

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

3.8 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.9 WASTE MANAGEMENT

As specified in the Waste Management Plan and as follows. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste in designated containers. Coordinate with manufacturer for take-back program. Set aside scrap to be returned to manufacturer for recycling into new product. When such a service is not available, local recyclers shall be sought after to reclaim the materials. Set aside extra paint for future color matches or reuse by the Government. Where local options exist for leftover paint recycling, collect all waste paint by type and provide for delivery to recycling or collection facility for reuse by local organizations.

3.10 PAINT TABLES

All DFT's are minimum values. Use only materials with a GPS green check mark having a minimum MPI "Environmentally Friendly" E1 rating based on VOC (EPA Method 24) content levels. Acceptable products are listed in the MPI Green Approved Products List, available at http://www.specifygreen.com/APL/ProductIdxByMPInum.asp.

3.10.1 EXTERIOR PAINT TABLES

DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

STEEL / FERROUS SURFACES

A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3

1. Alkyd
   New; MPI EXT 5.1Q-G5 (Semigloss) Existing; MPI REX 5.1D-G5

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 94	MPI 94

   System DFT: 5.25 mils

   New; MPI EXT 5.1Q-G6 (Gloss) / Existing; MPI REX 5.1D-G6

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 9	MPI 9

   System DFT: 5.25 mils

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

A. New Concrete masonry:

1. High Performance Architectural Latex

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

MPI INT 4.2D-G5 (Semigloss)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 141	MPI 141

System DFT: 11 mils

Fill all holes in masonry surface

B. Existing, previously painted Concrete masonry:

1. High Performance Architectural Latex

MPI RIN 4.2K-G5 (Semigloss)

Spot Primer:	Intermediate:	Topcoat:
MPI 50	MPI 141	MPI 141

System DFT: 4.5 mils

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Metal, Mechanical, Electrical, Surfaces adjacent to painted surfaces (Match surrounding finish), and miscellaneous metal items not otherwise specified except new prefinished equipment:

1. Alkyd

MPI INT 5.1E-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 47	MPI 47

System DFT: 5.25 mils

-- End of Section --

SECTION 10 14 01

EXTERIOR SIGNAGE
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 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 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	(2013) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

1.2 GENERAL REQUIREMENTS

All exterior signage shall be provided by a single manufacturer. Exterior signage shall be of the design, detail, sizes, types, and message content shown on the drawings, shall conform to the requirements specified, and shall be provided at the locations indicated. Submit exterior signage schedule in electronic media with spread sheet format. Spread sheet shall include sign location, sign type, and message. Signs shall be complete with lettering, framing as detailed, and related components for a complete installation. Each sample shall consist of a complete sign panel with letters and symbols. Samples may be installed in the work, provided each sample is identified and location recorded. Submit three color samples for each material requiring color and 12 inch square sample of sign face color sample.

1.3 SUSTAINABILITY REQUIREMENTS

Materials in this technical specification may contribute towards contract compliance with sustainability requirements.

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. 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

Approved Detail Drawings; G

SD-03 Product Data

Installation
Exterior Signage; G

SD-04 Samples

Exterior Signage; G

SD-10 Operation and Maintenance Data

Protection and Cleaning

SD-11 Closeout Submittals

1.5 QUALIFICATIONS

Dimensional letters shall be the standard product of a manufacturer regularly engaged in the manufacture of the products. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least 2 years prior to bid opening.

1.6 DELIVERY AND STORAGE

Materials shall be wrapped for shipment and storage, delivered to the jobsite in manufacturer's original packaging, and stored in a clean, dry area in accordance with manufacturer's instructions.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

PART 2 PRODUCTS

2.1 GRAPHICS FOR EXTERIOR SIGNAGE SYSTEMS

2.1.1 Graphics

Signage graphics shall conform to the following:

a. Message shall be applied to panel using the silkscreen process. Silkscreened images shall be executed with photo screens prepared from original art. Handcut screens will not be accepted. Original art shall be defined as artwork that is a first generation pattern of the original specified art. Edges and corners shall be clean. Rounded corners, cut or ragged edges, edge buildup, bleeding or surfaces pinholes will not be accepted.

b. Exterior signage shall be applied to .125" aluminum sheet panel and

fastened to entrance door of building with stainless steel screws. Sign size, color, format, and font shall be submitted for approval.

2.2 ANCHORS AND FASTENERS

Exposed anchor and fastener materials shall be compatible with metal to which applied and shall match in color and finish and shall be non-rusting, non-corroding, and non-staining. Exposed fasteners shall be tamper-proof.

2.3 SHOP FABRICATION AND MANUFACTURE

2.3.1 Factory Workmanship

Work shall be assembled in the shop, as far as practical, ready for installation at the site. Work that cannot be shop assembled shall be given a trial fit in the shop to ensure proper field assembly. Holes for bolts and screws shall be drilled or punched. Drilling and punching shall produce clean, true lines and surfaces. Welding to or on structural steel shall be in accordance with AWS D1.1/D1.1M. Welding shall be continuous along the entire area of contact. Exposed welds shall be ground smooth. Exposed surfaces of work shall have a smooth finish and exposed riveting shall be flush. Fastenings shall be concealed where practical. Items specified to be galvanized shall be by hot-dip process after fabrication if practical. Galvanization shall be in accordance with ASTM A123/A123M and ASTM A653/A653M, as applicable. Other metallic coatings of steel sheet shall be in accordance with ASTM A924/A924M. Joints exposed to the weather shall be formed to exclude water. Drainage and weep holes shall be included as required to prevent condensation buildup.

2.3.2 Dissimilar Materials

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of asphalt varnish or a coat of zinc-molybdate primer to prevent galvanic or corrosive action.

PART 3 EXECUTION

3.1 INSTALLATION

Sign panel shall be installed in accordance with approved manufacturer's instructions at locations shown on the approved detail drawings; submit drawings showing elevations of each type of sign; dimensions, details, and methods of mounting or anchoring; shape and thickness of materials; and details of construction. A schedule showing the location, each sign type, and message shall be included. Signs shall be installed plumb and true at mounting heights indicated, and by method shown or specified. Signs mounted on other surfaces shall not be installed until finishes on such surfaces have been completed. Submit manufacturer's installation instructions and cleaning instructions.

3.1.1 Anchorage

Anchorage and fastener materials shall be in accordance with approved manufacturer's instructions for the indicated substrate.

3.1.2 Protection and Cleaning

The work shall be protected against damage during construction.

-- End of Section --

SECTION 10 44 16

FIRE EXTINGUISHERS
05/12

PART 1 GENERAL

1.1 REFERENCES

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

INTERNATIONAL CODE COUNCIL (ICC)

ICC IFC	(2012) International Fire Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1	(2012; TIA 11-1) Fire Code
NFPA 10	(2013) Standard for Portable Fire Extinguishers
NFPA 101	(2012; Amendment 1 2012) Life Safety Code

UNDERWRITERS LABORATORIES (UL)

UL 299	(2012) Dry Chemical Fire Extinguishers

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
Manufacturer's Data

SD-02 Shop Drawings
Fire Extinguishers
Accessories
Cabinets
Wall Brackets

SD-03 Product Data
Fire Extinguishers
Accessories
Wall Brackets
Replacement Parts

SD-04 Samples
Fire Extinguisher
Wall Brackets
Accessories

SD-07 Certificates
Fire Extinguishers
Manufacturer's Warranty with Inspection Tag

1.3 DELIVERABLES

1.3.1 Samples

Provide the following samples: One of each type of Fire Extinguisher being installed; one full-sized sample of each type of Cabinets being installed; three samples of Wall Brackets and Accessories of each type being used.

Approved samples may be used for installation, with proper identification and storage.

1.4 DELIVERY, HANDLING, AND STORAGE

Protect materials from weather, soil, and damage during delivery, storage, and construction.

Deliver materials in their original packages, containers, or bundles bearing the brand name and the name and type of the material.

1.5 WARRANTY

Guarantee that Fire Extinguishers are free of defects in materials, fabrication, finish, and installation and that they will remain so for a period of not less than 2 years after completion.

PART 2 PRODUCTS

Submit fabrication drawings consisting of fabrication and assembly details performed in the factory and product data for the following items: Fire Extinguishers; Accessories, Wall Brackets.

2.1 TYPES

Submit certificates that show Fire Extinguishers comply with local codes and regulations.

Provide Fire Extinguishers conforming to NFPA 10. Provide quantity and placement in compliance with the applicable sections of ICC IFC, Section 1414 and ICC IFC, Section 906, NFPA 1, NFPA 101.

Provide dry chemical type fire extinguishers compliant with UL 299.

Submit Manufacturer's Data for each type of Fire Extinguisher required, detailing all related Cabinet, Wall Mounting and Accessories information, complete with Manufacturer's Warranty with Inspection Tag.

2.2 MATERIAL

Provide corrosion-resistant steel extinguisher shell.

2.3 SIZE

10 pound extinguishers.

2.4 ACCESSORIES

Forged brass valve

Fusible plug

Safety release

Antifreeze

Pressure gage

2.5 WALL BRACKETS

Provide wall-hook fire extinguisher wall brackets.

Provide wall bracket and accessories as approved.

PART 3 EXECUTION

3.1 INSTALLATION

Install Fire Extinguishers where indicated on the drawings. Verify exact locations prior to installation.

Comply with the manufacturer's recommendations for all installations.

Provide extinguishers which are fully charged and ready for operation upon installation. Provide extinguishers complete with Manufacturer's Warranty with Inspection Tag attached.

3.2 ACCEPTANCE PROVISIONS

3.2.1 Repairing

Remove and replace damaged and unacceptable portions of completed work with new work at no additional cost to the Government.

Submit Replacement Parts list indicating specified items replacement part, replacement cost, and name, address and contact for replacement parts distributor.

3.2.2 Cleaning

Clean all surfaces of the work, and adjacent surfaces which are soiled as a result of the work. Remove from the site all construction equipment, tools, surplus materials and rubbish resulting from the work.

-- End of Section --

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