



**VA** | U.S. Department  
of Veterans Affairs

LEO A DALY

# **Los Angeles National Cemetery Columbarium Expansion Phase 1B**

VA PROJECT NO.: VA101CFM-P-0147  
**SPECIFICATIONS  
CONSTRUCTION DOCUMENT  
CD-2 SUBMITTAL  
VOLUME I**  
January 30, 2017

**DEPARTMENT OF VETERANS AFFAIRS**  
**OFFICE OF CONSTRUCTION AND FACILITIES MANAGEMENT**  
**LOS ANGELES NATIONAL CEMETERY COLUMBARIA EXPANSION**  
**AND CEMETERY IMPROVEMENTS**  
**SPECIFICATIONS AND APPENDICES**  
**TABLE OF CONTENTS**  
**Section 00 01 10**

	<b>VOLUME I - DIVISIONS 01 - 14</b>	<b>Author</b>
	<b>DIVISION 00 - SPECIAL SECTIONS</b>	
00 01 10	TABLE OF CONTENTS	Conspectus
	<b>DIVISION 01 - GENERAL REQUIREMENTS</b>	
01 00 01	General Requirements	VA
01 32 16.13	Network Analysis Schedules (NCA)	Conspectus
01 33 23	Shop Drawings, Product Data, and Samples	Conspectus
01 42 19	Reference Standards	Conspectus
01 45 00	Quality Control	VA
01 45 29	Testing Laboratory Services	Conspectus
01 57 19	Temporary Environmental Controls	Conspectus
01 64 00	Owner-Furnished Products	Conspectus
01 74 19	Construction Waste Management	Conspectus
	<b>DIVISION 02 - EXISTING CONDITIONS</b>	
02 21 00	Site Surveys	KPFF
02 41 10	Demolition and Site Clearing	KPFF
02 82 13.41	Asbestos Abatement For Total Demolition Projects	Conspectus
02 83 33.13	Lead-Based Paint Removal and Disposal	Conspectus
	<b>DIVISION 03 - CONCRETE</b>	
03 30 53	(Short-Form) Cast-in-Place Concrete	KPFF
03 48 24	Pre-Cast Concrete Columbarium Units	LA Group
	<b>DIVISION 04 - MASONRY</b>	
04 05 13	Masonry Mortaring	KPFF
04 05 16	Masonry Grouting	KPFF
04 20 00	Unit Masonry	KPFF
04 43 00	Cut Stone	LA Group
04 73 01	Columbarium Niche Covers Marble	LA Group
07 72 00	Cast Stone Masonry	LA Group
04 73 10	Memorial Marker-Marble	LA Group
	<b>DIVISION 05 - METALS</b>	
05 12 00	Structural Steel Framing	KPFF
05 31 00	Steel Decking	KPFF
05 36 00	Composite Metal Decking	KPFF
05 50 00	Metal Fabrications	Conspectus

	<b>DIVISION 06 - WOOD, PLASTICS AND COMPOSITES</b>	
06 10 00	Rough Carpentry	Conspectus
06 20 00	Finish Carpentry	Conspectus
	<b>DIVISION 07 - THERMAL AND MOISTURE PROTECTION</b>	
07 11 13	Bituminous Dampproofing	Conspectus
07 13 54	Thermoplastic Sheet Waterproofing	LA Group
07 22 00	Roof and Deck Insulation	Conspectus
07 27 27	Fluid-Applied Membrane Air Barriers, Vapor Retarding	Conspectus
07 41 13	Standing Seam Metal Roofing	Conspectus
07 54 19	Polyvinyl-Chloride (PVC) Roofing	Conspectus
07 60 00	Flashing and Sheet Metal	Conspectus
07 84 00	Firestopping	Conspectus
07 92 00	Joint Sealants	Conspectus
	<b>DIVISION 08 - OPENINGS</b>	
08 11 13	Hollow Metal Doors and Frames	Conspectus
08 71 00	Door Hardware	Conspectus
	<b>DIVISION 09 - FINISHES</b>	
09 06 00	Schedule for Finishes	Conspectus
09 22 16	Non-Structural Metal Framing	Conspectus
09 29 00	Gypsum Board	Conspectus
09 30 13	Tiling	Conspectus
09 54 26	Wood Plank Ceilings	Conspectus
09 65 13	Resilient Base and Accessories	Conspectus
09 91 00	Painting	Conspectus
	<b>DIVISION 10 - SPECIALTIES</b>	
10 14 00	Exterior Signage	LA Group
10 21 13	Toilet Compartments	Conspectus
10 28 00	Toilet and Bath Accessories	Conspectus
	<b>DIVISION 11 - EQUIPMENT - NOT USED</b>	
	<b>DIVISION 12 - FURNISHINGS</b>	
12 93 10	Granite Site Furnishings	LA Group
	<b>DIVISION 13 - SPECIAL CONSTRUCTION - NOT USED</b>	
	<b>DIVISION 21 - FIRE SUPPRESSION - NOT USED</b>	

	<b>VOLUME II - DIVISIONS 22 - 33</b>	<b>Author</b>
	<b>DIVISION 22 - PLUMBING</b>	
22 05 11	Common Work Results for Plumbing	Mazzetti
22 05 23	General-Duty Valves for Plumbing Piping	Mazzetti
22 11 00	Facility Water Distribution	Mazzetti
22 13 00	Facility Sanitary and Vent Piping	Mazzetti
22 33 00	Electric Domestic Water Heaters	Mazzetti
22 40 00	Plumbing Fixtures	Mazzetti
	<b>DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)</b>	
23 05 11	Common Work Results for HVAC	Mazzetti
23 05 12	General Motor Requirements for HVAC and Steam Generation Equipment	Mazzetti
23 05 41	Noise and Vibration Control for HVAC Piping and Equipment	Mazzetti
23 05 93	Testing, Adjusting, and Balancing for HVAC	Mazzetti
23 07 11	HVAC and Plumbing Insulation	Mazzetti
23 08 00	Commissioning of HVAC Systems	Mazzetti
23 23 00	Refrigerant Piping	Mazzetti
23 31 00	HVAC Ducts and Casings	Mazzetti
23 34 00	HVAC Fans	Mazzetti
23 37 00	Air Outlets and Inlets	Mazzetti
23 40 00	HVAC Air Cleaning Devices	Mazzetti
23 81 43	Air-Source Unitary Heat Pumps	Mazzetti
	<b>DIVISION 26 - ELECTRICAL</b>	
26 05 11	Requirements for Electrical Installations	Mazzetti
26 05 19	Low-Voltage Electrical Power Conductors and Cables	Mazzetti
26 05 26	Grounding and Bonding for Electrical Systems	Mazzetti
26 05 33	Raceway and Boxes for Electrical Systems	Mazzetti
26 05 41	Underground Electrical Construction	Mazzetti
26 24 16	Panelboards	Mazzetti
26 27 13	Electricity Metering	Mazzetti
26 27 26	Wiring Devices	Mazzetti
26 29 21	Enclosed Switches and Circuit Breakers	Mazzetti
26 51 00	Interior Lighting	Mazzetti
26 56 00	Exterior Lighting	Mazzetti
	<b>DIVISION 27 - COMMUNICATIONS</b>	
27 05 11	Requirements for Communications Installations	Mazzetti
27 05 26	Grounding and Bonding for Communications Systems	Mazzetti
27 05 33	Raceways and Boxes for Communications Systems	Mazzetti
27 08 00	Commissioning of Communications Systems	Mazzetti
27 10 00	Structured Cabling	Mazzetti
27 11 00	Communications Equipment Room Fittings	Mazzetti
27 15 00	Communications Horizontal Cabling	Mazzetti
27 31 00	Voice Communications Switching and Routing Equipment	Mazzetti
27 52 31	Security Emergency Call, Duress Alarm, and Telecommunications	Mazzetti

	<b>DIVISION 28 - ELECTRONIC SAFETY AND SECURITY</b>	
28 05 00	Common Work Results for Electronic Safety and Security	Mazzetti
28 08 00	Commissioning of Electronic Safety and Security Systems	Mazzetti
28 13 00	Physical Access Control System	Mazzetti
28 13 53	Security Access Detection	Mazzetti
28 23 00	Video Surveillance	Mazzetti
	<b>DIVISION 31 - EARTHWORK</b>	
31 20 00	Earth Moving	CIVIL
	<b>DIVISION 32 - EXTERIOR IMPROVEMENTS</b>	
32 05 23	Cement and Concrete for Exterior Improvements	KPFF
32 12 16	Asphalt Paving	KPFF
32 14 00	Unit Paving	LA Group
32 14 40	Stone Paving	LA Group
32 30 00	Site Furnishings	LA Group
32 31 00	Decorative Metal Fence	LA Group
32 31 13	Chain Link Fences and Gates	LA Group
32 84 00	Planting Irrigation	Aqua Eng
32 90 00	Planting	LA Group
	<b>DIVISION 33 - UTILITIES</b>	
33 10 00	Water Utilities	KPFF
33 30 00	Sanitary Sewerage Utilities	KPFF
33 40 00	Storm Sewer Utilities	KPFF
33 46 13	Foundation Drainage	KPFF

- - - E N D - - -

**SECTION 01 00 01  
GENERAL REQUIREMENTS  
TABLE OF CONTENTS**

1.1 GENERAL INTENTION .....	1
1.2 STATEMENT OF BID ITEM(S) .....	2
1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR .....	2
1.4 CONSTRUCTION SECURITY REQUIREMENTS .....	2
1.5 FIRE SAFETY .....	4
1.6 OPERATIONS AND STORAGE AREAS .....	6
1.7 DISPOSAL AND RETENTION .....	10
1.8 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS .....	11
1.9 RESTORATION .....	13
1.10 PHYSICAL DATA .....	13
1.11 PROFESSIONAL SURVEYING SERVICES .....	14
1.12 LAYOUT OF WORK .....	14
1.13 AS-BUILT DRAWINGS .....	17
1.14 USE OF ROADWAYS .....	18
1.15 RE/COR'S FIELD OFFICE .....	19
1.16 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT .....	23
1.17 TEMPORARY TOILETS .....	24
1.18 AVAILABILITY AND USE OF UTILITY SERVICES .....	25
1.19 NEW TELEPHONE EQUIPMENT .....	26
1.20 TESTS .....	26
1.21 INSTRUCTIONS .....	27
1.22 GOVERNMENT-FURNISHED PROPERTY .....	29
1.23 RELOCATED EQUIPMENT .....	29
1.24 CONSTRUCTION SIGN .....	30
1.25 SAFETY SIGN .....	30

GENERAL REQUIREMENTS

1.26 CONSTRUCTION DIGITAL IMAGES .....	31
1.27 FINAL ELEVATION DIGITAL IMAGES .....	33
1.28 HISTORIC PRESERVATION .....	34
1.29 PROJECT HEALTH AND SAFETY PLAN .....	34
1.30 PROJECT SUSTAINABILITY GOALS .....	34

**SECTION 01 00 01 (MAJOR NCA PROJECTS)**  
**GENERAL REQUIREMENTS**

**1.1 GENERAL INTENTION**

- A. Completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for Los Angeles National Cemetery Columbarium as required by drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the Cemetery Director.
- C. Offices of Leo A. Daly as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Resident Engineer (RE) or duly authorized Contracting Officer Representative (COR).
- D. All Testing Laboratory services will be retained and paid for by the Contractor (see Spec. Section 01 45 29 Testing Laboratory Services). However, the Department of Veterans Affairs may elect to retain its own Testing Laboratory for any purpose. Before placement and installation of work subject to tests by testing laboratory retained by Department of Veterans Affairs, the notify the RE/COR in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall not be less than three working days unless otherwise designated by the RE/COR.
- E. All employees of general contractor and subcontractors shall comply with VA security management program. Obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access. Photo ID shall be required by all personnel.
- F. Prior to commencing work, general contractor shall provide proof that an OSHA certified "competent person" (CP) as defined in 29 CFR 1926.20(b)(2) will maintain a presence at the work site whenever the general contractor or subcontractors are present.
- G. Training:
  - 1. All employees of general contractor or subcontractors having supervisory responsibilities shall have the 30-hour OSHA certified Construction Safety course and/or other relevant competency training, as determined by VA CP.



2. All other employees of general contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course and/or other relevant competency training. Relevant competency training shall be as determined acceptable by the VA CP.
3. Submit training records of all such employees for approval before the start of work.

#### **1.2 STATEMENT OF BID ITEM(S)**

- A. CLIN 001, GENERAL CONSTRUCTION: Work of the Contract includes general construction, alterations, roads, walks, grading, drainage, mechanical and electrical work, utility systems, water storage facilities, precast columbaria and necessary removal of existing structures and construction and certain of other items.

#### **1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR**

- A. AFTER AWARD OF CONTRACT, five (5) full-sized drawing sets and five (5) sets of specifications will be furnished as well as an electronic set of plans and specifications.
- B. Additional sets of drawings may be made by the Contractor, at Contractor's expense.

#### **1.4 CONSTRUCTION SECURITY REQUIREMENTS**

- A. Security Plan:
  1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
  2. Assure that all sub-contractors working on the project and their employees also comply with these regulations. Dismissal of violators may be directed by the Resident Engineer.
- B. Security Procedures:
  1. Contractor's employees shall not enter the project site without an appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
  2. For working outside the "regular hours" as defined in the contract, give 3 days' notice to the RE/COR so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.
  3. No photography of VA premises is allowed without written permission of the RE/COR.

4. VA reserves the right to close down or shut down the project site and order Contractor's employees off the premises in the event of a national emergency. Return to the site only with the written approval of the RE/COR.

C. Guards:

1. Provide unarmed guards at the project site 24 hours a days, 7 days a week after construction hours to deter vandalism or theft within the contract work areas.
2. The guard shall have communication devices to report events as directed by Local Police Department and/or VA police.
3. Secure the project site, work in progress, materials, tools, equipment and any other materials within the project site that are not under operational control of the Cemetery staff. The use of guards is a Contractor responsibility to deter theft and/or vandalism within the project work area. Coordinate the use of guards with the RE following input from the Cemetery Operations through the RE. Any guards provided shall be able to communicate with the local police.

D. Key Control:

1. Provide duplicate keys and lock combinations to the RE/COR for the purpose of security inspections of every area of project including tool boxes and parked machines and to take any emergency action(s).
2. Turn over all permanent lock cylinders to the VA locksmith for permanent installation. Coordinate the lock cylinder and key system work and shall provide the devices required to comply with the facility security system. See Section 08 71 00, DOOR HARDWARE and coordinate.

E. Document Control:

1. Perform safekeeping procedures for all drawings, project manual and other project information. This information from these shall be shared only with those with a specific need to accomplish the project.
2. Certain documents, sketches, videos or photographs and drawings may be marked "Law Enforcement Sensitive" or "Sensitive Unclassified". Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the RE/COR upon request.

3. These security documents shall not be removed or transmitted from the project site without the written approval of the RE/COR.
4. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
5. Notify RE/COR immediately when there is a loss or compromise of "sensitive information".
6. All electronic information shall be stored in a specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).

F. Motor Vehicle Restrictions

1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.

**1.5 FIRE SAFETY**

- A. Applicable Publications: Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. American Society for Testing and Materials (ASTM):

E84-2013	Surface Burning Characteristics of Building Materials
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2. National Fire Protection Association (NFPA):

10-2013	Standard for Portable Fire Extinguishers
30-2012	Flammable and Combustible Liquids Code
51B-2014	Standard for Fire Prevention During Welding, Cutting and Other Hot Work
70-2011	National Electrical Code
241-2013	Standard for Safeguarding Construction, Alteration, and Demolition Operations

3. Occupational Safety and Health Administration (OSHA):

29 CFR 1926	Safety and Health Regulations for Construction
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- B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to RE for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP

DRAWINGS, PRODUCT DATA AND SAMPLES. Prior to any worker for the contractor or subcontractor's beginning work, they shall undergo a safety briefing provided by the Contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of NCA equipment, etc. Documentation shall be provided to the RE/COR that individuals have undergone the Contractor's safety briefing.

- C. Site and Building Access: Maintain free and unobstructed access to emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- E. Temporary Construction Partitions:
  - 1. Not applicable this project
- F. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- G. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with RE.
- H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to RE/COR.
- I. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- J. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- K. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with RE and obtain permission from RE before commencing hot work. Designate the Contractor's responsible project-site fire prevention program manager to coordinate hot work.
- L. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to RE.
- M. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate

and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.

- P. Dispose of waste and debris in accordance with NFPA 241 and Construction Waste Management Plan required under Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT. Remove from buildings daily.
- Q. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

#### **1.6 OPERATIONS AND STORAGE AREAS**

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the RE/COR. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage trailers, office trailers) and utilities may be erected by the Contractor only with the approval of the RE/COR and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work.
- C. The Contractor shall, under regulations prescribed by the RE/COR, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the RE/COR. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.
- D. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
- E. Working space and space available for storing materials shall be as shown on the drawings and may be altered/expanded as determined by the RE/COR.
- F. Workmen are subject to rules of the Cemetery regarding their conduct and dress code.

- G. Execute work so as to interfere as little as possible with normal functioning of Cemetery as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others.
1. Do not store materials and equipment in other than assigned areas.
  2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by the Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access, for the Cemetery personnel, to areas that are required to remain in operation during the construction of the project.
  3. Where access by Cemetery personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements. All such actions shall be coordinated with the Utility Company involved and the RE/COR.
- H. Phasing: To insure such executions, furnish the RE/COR with a schedule of approximate phasing and dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, notify the RE/COR two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such dates to insure accomplishment of this work in successive and/or concurrent phases as is mutually agreeable to the RE/COR and Contractor.
- I. Construction Fence: Before construction operations begin, the Contractor shall provide a chain link construction fence, 2.1m (seven feet) minimum height, around the construction area indicated on the drawings. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced at maximum 375mm (15 inches). Bottom of fences shall extend to 25mm (one inch) above grade. Remove the fence when directed by RE/COR.
- J. Utilities Services: Maintain existing utility services for the Cemetery at all times. Meet with the RE and appropriate Cemetery operations staff to walk the proposed work areas and discuss any known or potential underground systems that are indicated or not shown on the construction drawings, prior to starting the work.

1. Provide an underground utility locating service to locate any existing underground lines within the work area that are to remain in service. Any new information, not clearly indicated on the bid documents shall be passed on to the Contractor's underground locating service staff. Any new information discovered by the underground locating service staff shall be turned over to the RE/COR for resolution.
- K. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by the RE/COR.
1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of the RE/COR. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the RE/COR, and Cemetery Director's prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, 27 05 11 REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS for additional requirements.
  2. Submit a request to interrupt any such services to RE/COR, and Cemetery Director, in writing, 21 calendar days in advance of the outage to the RE. Request shall state reason, date, exact time of, and approximate duration of such interruption.
  3. The Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of the Cemetery. Interruption time approved by the Cemetery may occur at other than Contractor's normal working hours at no additional cost to the Government.
  4. Major interruptions of any system must be requested, in writing, at least 21 calendar days prior to the desired time and shall be performed as directed by the RE/COR, which may require the work to

- be performed off hours which shall be done at no additional cost to the Government.
5. In case of a contract construction emergency, service will be interrupted on approval of RE/COR. Such approval will be confirmed in writing as soon as practical.
  6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
- L. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed. Lines shall be capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.
- M. To minimize interference of construction activities with flow of Cemetery traffic, comply with the following:
1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles. Wherever excavation for new utility lines cross existing roads, at least one lane must be open to traffic at all times.
  2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the RE/COR.
- N. Coordinate the work for this contract with other construction operations as directed by RE/COR.
- O. Coordination of Construction with Cemetery Director: The burial activities at a National Cemetery shall take precedence over construction activities. Cooperation and coordination with the Cemetery Director, through the RE/COR, in arranging construction schedule to cause the least possible interference with Cemetery activities in actual burial areas, is required. Construction noise during the interment services shall not disturb the service. Coordination of work may require that equipment that is heard from the service location be shut-off, or moved out of the area prior to the service, as acceptable



to the Cemetery Director through the RE/COR. Trucks and workmen shall not pass through the service area during this period:

1. Discontinue work sufficiently in advance of Easter Sunday, Mother's Day, Father's Day, Memorial Day, Veteran's Day and/or Federal holidays, and clean up all areas of operation adjacent to functioning areas of the Cemetery, including existing burial sections before these dates.
2. Clean-up activities shall include the removal of all equipment, tools, materials and debris and leaving the areas in a clean, neat condition.

#### **1.7 DISPOSAL AND RETENTION**

A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:

1. Reserved items which are to remain property of the Government are identified by attached tags or noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by RE/COR.
2. Items not reserved shall become property of the Contractor and be removed by Contractor from the National Cemetery.
3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.
4. PCB Transformers and Capacitors: The Contractor shall be responsible for disposal of the Polychlorinated Biphenyl (PCB) transformers and capacitors. The transformers and capacitors shall be taken out of service and handled in accordance with the procedures of the Environmental Protection Agency (EPA) and the Department of Transportation (DOT) as outlined in Code of Federal Regulation (CFR), Titled 40 and 49 respectively. The EPA's Toxic Substance Control Act (TSCA) Compliance Program Policy Nos. 6-PCB-6 and

6-PCB-7 also apply. Upon removal of PCB transformers and capacitors for disposal, the "originator" copy of the Uniform Hazardous Waste Manifest (EPA Form 8700-22), along with the Uniform Hazardous Waste Manifest Continuation Sheet (EPA Form 8700-22A) shall be returned to the RE/COR who will annotate the contract file and transmit the Manifest to the Cemetery Director.

a. Copies of the following listed CFR titles may be obtained from the Government Printing Office:

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 761	PCB Manufacturing, Processing, Distribution in Commerce, and use Prohibitions
49 CFR 172	Hazardous Material tables and Hazardous Material Communications Regulations
49 CFR 173	Shippers - General Requirements for Shipments and Packaging
49 CRR 173	Subpart A General
49 CFR 173	Subpart B Preparation of Hazardous Material for Transportation
49 CFR 173	Subpart J Other Regulated Material; Definitions and Preparation
TSCA	Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7

#### **1.8 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS**

A. Preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work sites, which are not to be removed and which do not unreasonably interfere with the work required under this contract. Remove trees only when specifically authorized to do so, avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, then trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the RE/COR.

- B. Protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. Repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the RE/COR may have the necessary work performed and charge the cost to the Contractor. Paragraphs 1.10.A and 1.10.B are from (FAR 52.236-9).
- C. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.
- D. Refer to FAR clause 52.236-7, "Permits and Responsibilities," which is included in General Conditions. A National Pollutant Discharge Elimination System (NPDES) permit is required for this project. The Contractor is considered an "operator" under the permit and has extensive responsibility for compliance with permit requirements. VA will make the permit application available at the (appropriate NCA Central/Cemetery) office. The apparent low bidder, contractor and affected subcontractors shall furnish all information and certifications that are required to comply with the permit process and permit requirements. Many of the permit requirements will be satisfied by completing construction as shown and specified. Some requirements involve the Contractor's method of operations and operations planning and the Contractor is responsible for employing best management practices. The affected activities often include, but are not limited to the following:
1. Designating areas for equipment maintenance and repair;
  2. Providing waste receptacles at convenient locations and provide regular collection of wastes;
  3. Locating equipment wash down areas on site, and providing appropriate control of wash-waters;
  4. Providing protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials; and
  5. Providing adequately maintained sanitary facilities.

## **1.9 RESTORATION**

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the RE/COR. Existing work to be altered or extended and is found to be defective in any way, shall be reported to the RE/COR before it is disturbed. Materials and workmanship used in restoring work shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At the Contractor's own expense, immediately restore to service and repair any damage caused by the Contractor's workmen to any operational existing piping and conduits, wires, cables, etc. The above is applicable for all owner operated systems with underground elements or those of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

## **1.10 PHYSICAL DATA**

- A. Data and information furnished in the bid documents is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.
- B. Subsurface conditions have been developed by core borings and test pits. Logs of subsurface exploration are shown diagrammatically on drawings.

- C. A copy of the soil report will be made available for inspection by bidders upon request to the Contracting Officer, the contract documents.
- D. The Government does not guarantee that other materials will not be encountered nor that proportions, conditions or character of several materials will not vary from those indicated by explorations. Bidders are expected to examine the site of work and logs of borings and, after investigation, decide for themselves the character of materials and make their bids accordingly. Upon proper application to the Department of Veterans Affairs, bidders will be permitted to make subsurface explorations of their own at site.

#### **1.11 PROFESSIONAL SURVEYING SERVICES**

- A. A registered professional land surveyor or registered civil engineer whose services are retained and paid for by the Contractor shall perform services specified herein and in other specification sections. Provide a written certification to the RE/COR that the land surveyor or civil engineer is not one who is a regular employee of the Contractor, and that the land surveyor or civil engineer has no financial interest in this contract.

#### **1.12 LAYOUT OF WORK**

- A. Lay out the work from Government established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. Furnish, at the Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. Execute the work to the lines and grades that may be established or indicated by the RE/COR. Maintain and preserve all stakes and other marks established by the RE/COR until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the RE/COR may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor. Paragraph 1.14.A is from (FAR 52.236-17).
- B. Establish and plainly mark reference lines for all buildings, gravesite control monuments, locations for each sprinkler head within the burial section as detailed or at the point equal distance from the closest point on surrounding planned headstone locations, footings and foundations for columbarium and memorial walls and elements in their

respective complexes and all such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for each such structure and/or addition, and all other facilities to be constructed as part of the work for this project. The surveyed layout information shall be accurate to the highest industry standards for the respective type of work, all in accordance with lines, orientation, locations and elevations shown on contract drawings.

- C. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work. The Survey shall include, but not be limited to, location of lines and grades of footings, exterior walls, center lines of columns/piers in two directions, major utilities and elevations of floor slabs:

1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the RE/COR before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) are placed.
2. The forms for the concrete foundations, of the columbarium and memorial wall elements and complexes, where exposed in the final installation, require tighter construction tolerances than for general foundations (See Drawings for the allowable tolerances). For the exposed foundations of these elements provide such additional survey points and elevations as are needed so a registered land surveyor, or registered civil engineer can quickly check the work and provide the required certification(s) before concrete is poured. Contractor shall install and adjust the forms sufficiently in advance of scheduling the concrete pour(s) so they can be checked and certified prior to concrete being poured. The required certification(s) by the registered surveyor or engineer to the Contractor and/or RE/COR shall be provided before concrete is poured in the forms. The signed certification(s) shall identify the specific forms for which the certification is applicable, and shall contain language that clearly indicated that the identified foundation forms for the portions of the work that will be exposed

in the final installation, and to a depth below expansion joints where the foundations abut new rigid hardscape (concrete, stone, pavers, etc.) are at the correct location, correct dimensions, and correct orientation, and that the indicated pour elevations are correct, all according to the contract drawings, within the allowable construction tolerances. Indicate the allowable construction tolerance for the dimensions, orientation, location and elevation of the forms for layout and elevation of this work. The Certification that the form work and elevations are according to the design drawings, within allowable tolerances (which need to be indicated in the certification) should be provided to the RE/COR for review and acceptance prior to concrete for the foundations being poured.

- D. During progress of work, the Contractor shall have line grades and plumbness of all major form work checked and certified by a registered land surveyor or registered civil engineer as meeting requirements of contract drawings. Furnish such certification to the RE/COR before any major items of concrete work are placed. In addition, furnish to the RE/COR certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.
1. Lines of each building and/or addition.
  2. Elevations of bottoms of footings and tops of floors of each building and/or addition.
  3. Lines and elevations of sewers and of all outside distribution systems.
  4. Lines of grave plot documentation.
  5. Lines of elevations of all swales and interment areas.
  6. Lines and elevations of roads, streets and parking lots.
  7. Lines and elevations of top of pre-placed crypts.
  8. Lines and elevations of grade over pre-placed crypts.
  9. Northing/Easting coordinate locations of all water, sanitary, storm, gas and irrigation structures, directional fittings, control wire and lines.
- E. Upon completion of the work, the Contractor shall furnish the RE/COR with reproducible drawings, in AutoCAD form, at the scale of the contract drawings, showing the finished grade on the grid developed for constructing the work, including burial monuments and fifty foot

stationing along new road centerlines. These drawings shall bear the seal of the registered land surveyor or registered civil engineer.

- F. Perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

#### **1.13 AS-BUILT DRAWINGS**

- A. Maintain two full size sets of as-built drawings which will be kept current during construction of the project, which will include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the RE/COR's review, as often as requested.
- C. Deliver two approved completed sets of as-built drawings to the RE/COR within 15 calendar days after each completed phase and after the acceptance of the project by the RE/COR.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.
- E. Produce irrigation system "As-built" drawings that show the actual locations for the pipes, bends, fittings, wiring and appurtenances. The location for the underground materials as well as the depth shall be indicated, and curved pipe installations shall be so indicated, and bends and fittings shall have swing ties showing the locations, using physical features that will be visible in the winter, whenever possible. Swing ties shall be as close to perpendicular as possible. The "As-Built" drawing for the irrigation system wiring shall show the routing of the wires from controller to corresponding operational elements, and wire colors and numbers and color of spare wires shall be indicated. The wiring diagram for the irrigation system shall include the routing of the power lines to the equipment as well as the of the grounding equipment. The actual location of the installed elements on a scaled drawing shall be provided using the enlarged design drawing background to show the actual installation and not the schematic representation of the elements. All sleeves for pipes and/or wires shall be indicated with the size, type of material location and depth indicated on the "As-Built" drawings.
- F. Produce "As-Built" drawings of all subsurface infrastructure improvements, with the location and depth of the improvements being indicated on the drawings. The drawings shall have references indicated that will establish real world (State Plane) coordinates and



elevations on the drawing sheets. Infrastructure improvements that are below ground shall be clearly indicated and shall be located within 100mm (4-inches) of their actual location. If underground infrastructure improvements are not being located on the "As-Built" drawings using GPS coordinates (location and elevation), then the "As-Built" drawings shall have swing ties provided to ground surface above all infrastructure improvement locations needed to establish the route of the improvement on the ground surface immediately above the improvements, as well as the depth of the infrastructure improvement below the spot on the ground surface. All of the location and depth information shall be no greater than 100mm (4-inches) from the actual location of the respective infrastructure improvement when excavated from the indicated location to the indicated depth. Swing-tie information shall be from final project improvements, or existing improvements deemed final by the RE/COR and each location identified shall be by a minimum of two swing ties (close to 90 degrees apart).

#### **1.14 USE OF ROADWAYS**

- A. Under regulations prescribed by the RE/COR, use only established roadways, or use temporary roadways constructed by the Contractor when authorized by the RE/COR. Vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation.
- B. When materials are transported in prosecution of the work, use only established public roads and roads on Cemetery property and, when authorized by the RE/COR, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed and maintained by the Contractor at the Contractor's expense including all necessary erosion and sediment control facilities. When necessary to cross new or existing curbing, sidewalks, or similar construction, the Contractor must furnish install, maintain and remove adequate protection by well-constructed bridges.
- B. When new permanent roads are to be a part of this contract, the Contractor may construct them immediately to facilitate building operations. These roads may be used by all who have business thereon within zone of building operations.
- C. When certain buildings (or parts of certain buildings) are required to be completed in advance of general date of completion, all roads

leading thereto must be completed and available for use at the time set for completion of such buildings or parts thereof.

#### **1.15 RE/COR'S FIELD OFFICE**

- A. Within fifteen (15) days after receipt of "Notice to Proceed", provide, where shown on the drawings, a temporary field office, furniture, and minimum two inch deep gravel surfaced area for use of the RE/COR. Office and furniture shall be new.
- B. The field office shall provide not less than 134 square meters (1440 gross square feet) of floor area in one unit. Installation of the office shall meet all local codes.
- C. Provide office with two, 900 mm (three foot) wide exterior doors, including hardware and OSHA approved platform and stairs leading to grade.
- D. Enclose the entire perimeter of the office from the floor to the ground and finish to match exterior. Provide R7 insulation and seal tight to the ground with a painted 19 mm (3/4 inch) exterior grade plywood skirt.
- E. Exterior finishes shall be manufacturer's standards.
- F. Provide floor, wall, and roof with not less than R5 insulation.
- G. Interior finishes shall consist of resilient flooring, plywood paneling or painted wallboard on walls, and acoustical tile ceilings. Interior doors may be either painted or stained.
- H. Interior shall be subdivided with full height partitions to provide two offices, one sample room, one toilet, and meeting/Admin. Assistant area. Provide each space with 900 mm (three foot) wide door with master keyed locks. Section off an area with a low partition and counter for the Admin. Assistant's desk.
- I. Provide 750 mm (2-1/2 feet) wide by 900 mm (3 feet) high operable windows; two in each room (none required in sample room), except provide only one 600 mm (2 foot) high window in toilet room(s). Window openings shall be fitted with security bars to prevent any forced entry. The doors of field office shall have a hasp and padlock and also deadbolts keyed from both sides.
- J. Provide sufficient fluorescent lighting in each room to deliver 750 lux (70 foot-candles) of light at desk top height without the aid of daylight. Provide one light switch in each room.
- K. Provide one duplex receptacle in each wall of each room. If a wall is 3.0 m (10 feet) long or more, provide two receptacles for each 3.0 m

(10 feet), or portion thereof, of wall. Provide two duplex receptacles in low partition at Admin. Assistant's desk.

L. The Contractor shall provide the following:

1. Electricity, hot and cold water, and necessary utility services.  
Provide three cell phones with internet browser, e-mail and built in speaker phone for use by Resident Engineer's Office (SRE, RE and Admin. Assistant). In addition furnish one fully operational stand-alone speaker phone device that attaches to the cell phones for use in phone conferences.
2. All necessary piping, power circuits, network cabling, patch panels, equipment racks, cat 5e or better cabling for phones and computers, electrical fixtures, lighting, and other items necessary to provide a habitable structure for the purpose intended. Provide minimum of 12 network receptacles and 24 electrical receptacles located as approved by Resident Engineer upon review of the Contractor's submitted plan.
3. Thermostatically controlled, centralized heating and air conditioning system designed to maintain the temperature between 21 and 27 degrees C (70 and 80 degrees F) with 50 percent relative humidity maintained during the air conditioning season. Thermostats shall be energy saving programmable type with a minimum of three temperature settings for each day of the week.
4. One water closet, lavatory, mirror, toilet paper dispenser, paper towel dispenser, soap dispenser, towel bar, and two-prong coat hooks for each toilet room. Provide holding tank for sanitary sewer, including periodic pumping as required, or any other features needed to make the facility fully operational at the location, including provisions to keep from freezing.
5. One (1) wall mounted first aid kit that meets or exceeds current OSHA and AMSI Z.803-1 requirements.
6. One (1) wall mounted key safe with push-button combination lock sized for 48 keys.
7. Two (2) wall mounted 10 pound Tri-Class (ABC) dry chemical fire extinguishers.
8. Six (6) hard hats, white, full brim with ratchet headband system.
9. Six (6) ANSI 207 Class 2 safety vest in lime color with two pockets. Provide 3 size large and 3 size extra large.

10. The Contractor shall install a suitable security system for the field office and provide alarm monitoring services for the duration of the RE's occupancy.

M. For the duration of the RE/COR's occupancy, provide the following:

1. Satisfactory conditions in and around the field office and parking area.
2. Maintenance of gravel surfaced area, including the area for parking, in an acceptable condition for vehicle and foot traffic at all times.
3. Maintenance of utility services.
4. Weekly janitorial services and supplies (toilet paper, soap, paper towels, water etc.).
5. Potable water, fuel and electric power for normal office uses, including lights, heating and air conditioning.
6. Photocopier/Printer/Scanner/Fax Machine (complete with installation, service, maintenance, supplies and payment of all monthly usages charges):
  - a. Minimum Photocopier/Printer requirements:
    - 1) Collating/sorting/stapling.
    - 2) Enlarging/reducing
    - 3) Multi-size sheet feeder.
    - 4) Four paper tray sizes and bypass tray.
    - 5) Two-sided and single-sided copying.
    - 6) Network capability/connectivity
  - b. Minimum Scanner requirements:
    - 1) Scan to email and scan to folder capability.
    - 2) PDF, TIFF, JPEG output format capability
    - 3) Network capability/connectivity.
  - c. Minimum Fax Machine requirements:
    - 1) Plain paper copies.
    - 2) Memory feature with fifty documents.
    - 3) Automatic document feeder with 50 page capacity.
    - 4) Memory storage for twenty or more numbers.
    - 5) Network capacity/connectivity.
  - d. All services, maintenance and supplies shall be same day service.
7. Provide two-way radios (2 each) Motorola DTR650 (or equal) with rechargeable batteries and charging stations. These radios will remain the property of Contractor.

8. Internet, Data and Voice Equipment/Connection and Communications  
(complete installation, maintenance and payment of all monthly usage charges).
  - a. 2 Voice lines (one dedicated phone line for FAX machine and one dedicated phone line for communications)
  - b. Voice line numbers must have local area code.
  - c. Four (4) desk telephones, each with speaker, answering machine and long telephone cord.
  - d. One (1) conference room telephone set with conference speaker(s) and extra-long telephone cord.
  - e. Indoor equipment: Must provide separate RJ45 connections for data communications (CAT5 cabling) and RJ11 connections for analog voice communications in quantities specified in General Requirements paragraph 1.17.L.2 above. Provide central location for termination of the CAT5 cabling.
  - f. Data Connection: Provide T-1 connection lines. Methods and material shall be per ANSI/EIA/TIA-568-1991 Standard. Install (2) four pair Category 5e/6 cable unshielded twisted pair (total of 8 conductors) (UTP) Category 5e/6 IEEE 802.3 100BaseT UTP Level 5e/6, 24 AWG cables. Contractor shall supply 100BaseT, Category 5e or Category 6 certified rack-mounted modular RJ45 punch down block/panel as required (24/48 ports) for jacks meeting the ANSI/EIA/TIA-568-A-5 category 5e/6 standards.
  - g. 24/7 live phone-base technical support.
  - h. Next business day on-site support, maintenance and service.

N. The Contractor shall provide the following new items:

The list herein below indicates office furniture for the R.E. office facility. First is indicated the item number, followed by the number of the respective items to be provided, followed by the description and size of the items, with the metric size indicated first followed by the Imperial dimensions indicated in parentheses immediately after the metric dimensions.

1. (1) Secretary workstation with adjustable keying desk or drawer 738 mm H x 1.5 m W x 760 mm D (size 29-1/2" H x 60" W x 30" D)
2. (1) Printer stand 663 mm H x 1.5 m W x 750 mm D (size 26-1/2" H x 60" W x 30" D)
3. (3) Office desks, double pedestal
4. (1) Conference table 900 mm x 1.8 m (size 3' x 6')

5. (1) Plan table 1.2 m x 2.1 m (4' x 7')
  6. (3) Work tables 750 mm x 1.8 m (folding 30" x 72")
  7. (1) Secretary chair
  8. (4) Swivel chairs with arms
  9. (6) Conference chairs (armless & folding)
  - 10.(2) Arm Chairs
  - 11.(4) Lockable 5 drawer file cabinets, letter size
  - 12.(1) Drawing rack, with 12-750 mm (12-30 inch) "Plan Hold" drawing holders, freestanding
  - 13.(1) Shelves for sample room, 7 adjustable Shelves, 305 mm W x 900 mm L (12" W x 3' L)
  - 14.(3) Bookcases
  - 15.(1) Electric water cooler and provide a contract for water for the duration of the project.
  - 16.(1) Metal storage cabinet, 900 mm x 450 mm x 1.8 m (36" x 18" x 72") with six shelves.
- O. RE/COR's field office and facilities shall be relocated once after its initial installation at the Contractor's expense. Relocation consists of moving the field office and facilities to a location within the NCA site designated by the RE/COR together with providing and maintaining utilities, parking area, sanitary facilities and janitorial service in new location until completion and final acceptance of project.
- P. At the completion of all work, including the punch list, the RE/COR's field office and facilities shall become the property of the Contractor and the Contractor shall remove same, including utility connections, from the Cemetery. The site shall be restored to original condition and finished in accordance with contract requirements and be left intact, including utility connections, for future use by Department of Veterans Affairs. All 5 drawer file cabinets provided shall become the property of the Government.
- Q. Furnish floor plans for approval by the RE/COR prior to furnishing the field office.

#### **1.16 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT**

- A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to compliance with the following provisions:
1. Permission to use each unit or system must be given by RE/COR. If the equipment is not installed and maintained in accordance with the

following provisions, the RE/COR will withdraw permission for use of the equipment.

2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, and their overload elements shall be properly sized, coordinated and adjusted. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
  3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
  4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
  5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.
  6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.
- C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

#### **1.17 TEMPORARY TOILETS**

- A. Provide for use of all Contractor's workmen ample temporary sanitary toilet accommodations with suitable sewer and water connections, or when approved by RE/COR provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

#### **1.18 AVAILABILITY AND USE OF UTILITY SERVICES**

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.
- B. At Contractor's expense and in a workmanlike manner satisfactory to the RE/COR, install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, remove all the temporary connections, distribution lines, meters, and associated paraphernalia.
- C. Install meters at the Contractor's expense and furnish the Cemetery a monthly record of the Contractor's usage of electricity as hereinafter specified.
- D. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials by their respective manufacturers as required to prevent damage due to dampness or cold.
- E. Electricity (for Construction and Testing): Furnish all temporary electric services.
  - 1. Obtain electricity by connecting to the Cemetery electrical distribution system. Meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Where not available the contractor shall supply power via portable generators or temporary electric service from the electric utility company at own expense.
- F. Water (for Construction and Testing): Furnish temporary water service.
  - 1. Obtain water by connecting to the functional Cemetery water distribution system, potable or irrigation, as applicable for the application being tested. When in doubt use potable water. Provide reduced pressure backflow preventer at each connection to the existing potable water system. Water, where available, shall be provided at no cost to the Contractor. Pressure, flow rate and



volume of water shall be provided at conditions that will not disrupt the operations of the existing system, provide any facilities required to make the water source characteristics suitable for Contractor's intended use(s) without adversely impacting the existing system.

2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes, or causing unacceptable adverse impacts on the existing system, will be cause for immediate revocation (at RE/COR's discretion) of use of water from the Cemetery's system and will require or result in the Contractor connection(s) being immediately shut-off.

#### **1.19 NEW TELEPHONE EQUIPMENT**

- A. The contractor shall coordinate with the work of installation of permanent telephone equipment by others. This work shall be completed before the building is turned over to VA.

#### **1.20 TESTS**

- A. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.
- B. Conduct final tests required in various sections of specifications in presence of an authorized representative of the RE/COR. Furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.
- C. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire complex which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply; air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, hot water, controls and electricity, etc. Another example of a complex which involves several components of different disciplines is a burner installation. Efficient and acceptable burner operation depends upon the coordination and proper operation of fuel, combustion air, controls, and other related components.
- D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a

reasonably short period of time during which operating and environmental conditions remain reasonably constant.

- E. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

#### **1.21 INSTRUCTIONS**

- A. Furnish Maintenance and Operating manuals and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. Manuals: Maintenance and operating manuals (four copies each) for each separate piece of equipment shall be delivered to the RE/COR coincidental with the delivery of the equipment to the job site. Manuals shall be created for the various equipment functional systems, with the O&M for the individual pieces of equipment being included in the appropriate functional systems. Prepare an outline of the organization and structure of all of the O&M manuals to the RE/COR for review and approval, prior to creation of the manuals. This shall be done through the submittal process, and once approved the Contractor may proceed with the creation of the O&M manuals. Manuals shall be complete, well organized and easy to use, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include copies of the approved submittals for the equipment, in an Appendix for the manual, with a TOC listing the items and where the corresponding submittal materials are included. All pages in the Appendix shall be numbered and the TOC shall refer to the submittal locations based upon the page numbers. The TOC for the Appendix shall also refer each individual submittal item to the appropriate location in the functional diagram for the functional system for the respective O&M Manual. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. In addition to the diagrams and illustrations (which often do not actually

reflect the specific installation for the project), the Manuals shall include digital photographs of the actual equipment as installed, with digital annotations added using software like Adobe Pro where pdf images (photographs) can be annotated with text, arrows, lines, etc. To achieve this end result, the Contractor shall take photographs of the equipment as installed, BEFORE it is covered up, for the specific purpose of creating clear annotated photographs of the installation for the O&M Manuals. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

- C. Instructions: Provide qualified, factory-trained manufacturers' representatives to give detailed instructions to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Use an integrated, progressive method of providing instructions for different items of equipment that are component parts of a complete system. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the RE/COR and shall be considered concluded only when the RE/COR is satisfied in regard to complete and thorough coverage. All instruction periods where structured "training" of the use of the equipment is being provided to the Cemetery operations staff shall be videotaped and made into a DVD that can be used by the Cemetery staff as a refresher for the use of the specific equipment, or for training new personnel that are not familiar with the operation of the specific equipment. The Contractor shall be responsible for the creation of these "training videos" subject to the review and approval of the RE/COR. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the RE/COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

#### **1.22 GOVERNMENT-FURNISHED PROPERTY**

- A. The Government shall deliver to the Contractor, the Government-furnished property shown in the contract documents.
- B. Equipment furnished by the Government to be installed by the Contractor will be furnished to the Contractor at the Cemetery.
- C. Be prepared to receive this equipment from the Government and store or place such equipment not less than 90 days before Completion Date of project.
- D. Notify RE/COR in writing, 90 days in advance, of date on which Contractor will be prepared to receive equipment furnished by Government. Arrangements will then be made by the Government for delivery of equipment.
  - 1. Immediately upon delivery of equipment, the Contractor shall arrange for a joint inspection thereof with a representative of the Government. At such time the Contractor shall acknowledge receipt of equipment described, make notations, and immediately furnish the Government representative with a written statement as to its condition or shortages.
  - 2. The Contractor thereafter is responsible for such equipment until such time as acceptance of contract work is made by the Government.
- E. Equipment furnished by the Government will be delivered in a partially assembled condition in accordance with existing standard commercial practices. Contractor shall provide all fittings, fastenings, and appliances necessary for connections to respective services installed under contract. All fittings and appliances necessary to make the connection between the Government furnished equipment item and the final location shall be furnished and installed by the contractor at no additional cost to the Government.
- F. Completely assemble and install the Government furnished equipment in place ready for proper operation in accordance with specifications and drawings.
- G. Furnish supervision of installation of equipment at construction site by qualified factory trained technicians regularly employed by the equipment manufacturer.

#### **1.23 RELOCATED EQUIPMENT**

- A. Disconnect, dismantle as necessary, remove and reinstall in new location, all existing equipment as indicated in contract documents.

- B. Perform relocation of such equipment or items at such times and in such a manner as directed by the RE/COR.
- C. Suitably cap existing service lines, such as water, drain, gas, air, and/or electrical, whenever such lines are disconnected from equipment to be relocated. Remove abandoned lines in finished areas and cap as specified herein before under paragraph "Abandoned Lines".
- D. Provide all mechanical and electrical service connections, fittings, fastenings and any other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.
- E. All service lines such as noted above for relocated equipment shall be in place at point of relocation ready for use before any existing equipment is disconnected. Make relocated existing equipment ready for operation or use immediately after reinstallation.

#### **1.24 CONSTRUCTION SIGN**

- A. Provide a Construction Sign where directed by the RE/COR. All wood members shall be of framing lumber. Cover sign frame with 0.7 mm (24 gage) galvanized sheet steel nailed securely around edges and on all bearings. Provide three 100 by 100 mm (4 inch by 4 inch) posts (or equivalent round posts) set 1200 mm (four feet) into ground. Set bottom of sign level at 900 mm (three feet) above ground and secure to posts with through bolts. Make posts full height of sign. Brace posts with 50 x 100 mm (two by four inch) material as directed.
- B. Paint all surfaces of sign and posts two coats of white gloss paint. Border and letters shall be of black gloss paint, except project title which shall be blue gloss paint.
- C. Maintain sign and remove it when directed by the RE/COR.
- D. Detail Drawing of construction sign showing required legend and other characteristics of sign is shown on the drawings.

#### **1.25 SAFETY SIGN**

- A. Provide a Safety Sign where directed by RE/COR. Face of sign shall be 19 mm (3/4 inch) thick exterior grade plywood. Provide two 100 mm by 100 mm (four by four inch) posts extending full height of sign and 900 mm (three feet) into ground. Set bottom of sign level at 1200 mm (four feet) above ground.
- B. Paint all surfaces of Safety Sign and posts with one prime coat and two coats of white gloss paint. Letters and design shall be painted with gloss paint of colors noted.

- C. Maintain sign and remove it when directed by RE/COR.
- D. Detail Drawing Number 45 of safety sign showing required legend and other characteristics of sign is shown on the drawings./
- E. Post the number of accident free days on a daily basis.

#### **1.26 CONSTRUCTION DIGITAL IMAGES**

- A. During the construction period through completion, furnish Department of Veterans Affairs with 100 views of digital images, including one color print of each view and one Compact Disc (CD) per visit containing those views taken on that visit. Digital views shall be taken of exterior and/or interior and aerial photographs as selected and directed by RE/COR (RE). Each view shall be taken with a professional grade camera with minimum size of 6 megapixels (MP) and the images will be a minimum of 2272 x 1704 pixels for the 200x250mm (8x 10 inch) prints and 2592 x 1944 pixels for the 400x500 mm (16 x 20 inch) prints, as per these specifications:
  - 1. Normally such images including aerial photographs of the site will be taken at monthly intervals. However, the RE/COR may also direct the taking of special digital images at any time prior to completion and acceptance of contract. If the number of trips to the site exceeds an average of one per month of the contract performance period then an adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) of Section 00 72 00, GENERAL CONDITIONS.
  - 2. In event a greater or lesser number of images than specified above are required by the RE/COR, adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- B. Images shall be taken by a commercial photographer and must show distinctly, at as large a scale as possible, all parts of work embraced in the picture.
- C. Prints shall be made on 200 x 250 mm (8 by 10 inch) regular-weight matte archival grade photographic paper and produced by a process with a minimum of 300 pixels per inch (PPI). Prints must be printed using the commercial RA4 process (inkjet prints will not be acceptable). Photographs shall have 200 x 200 mm (8 by 8 inch) full picture print with no margin on three sides and a 50 mm (2 inches) margin on the bottom for pre-typed self-adhesive identity label to be added by

RE/COR. It is required that the prints are professionally processed so the quality will meet or exceed that of the same size print made with a film camera. Prints must be shipped flat to the RE/COR.

- D. Images on CD-ROM shall be recorded in JPEG format with a minimum of 24 bit color and no reduction in actual picture size. Compressed size of the file shall be no less than 80% or the original with no loss of information. File names shall contain the date the image was taken, the Project number and a unique sequential identifier. The CD-ROM shall also contain an index of all the images contained therein in either a TXT or Microsoft Word format.
- E. In case any set of prints are not submitted within five days of date established by RE/COR for taking thereof, the RE/COR may have such images/photographs taken and cost of same will be deducted from any money due to the Contractor.
- F. Interior Final Photos: After completion of all work in an area final interior photos will be taken. The camera must allow the colors to be as close as possible to the actual colors. For number and location of views, see Section 09 06 00, SCHEDULE FOR FINISHES. View shall be taken after final completion of work. The images shall also be provided on a CD to the RE Office.
- G. Aerial Photographs: Submit aerial photographs at one-month intervals during the entire construction period. The first aerial photo shall be taken just prior to the start of construction and then at one-month intervals. The final aerial photograph shall be taken at full project completion during a growing season when lawns are green and not dormant.
- H. Take digital photos of the daily work in progress, including close-ups. The photographs shall be of the actual work progress, intended to convey to the A/E team members the actual work in progress. The images shall be of both close-up in nature as well as panoramic in nature to get the feel for the entire work in progress, especially when there is site work in progress. In addition, work of product installations of materials that are going to be covered up, especially if before the A/E team member responsible for the design of the element if not going to be making a site visit before the work is covered up. The purpose of these photos is to allow another set of eyes on the work as it is in progress, as this will provide additional potential for catching things that aren't correct before they are buried or cast in concrete. It is

better to make things correct before they are poured in concrete. Having photos done on a daily basis, and posting them to one of more sites, to which the A/E team can be provided with easy access is also required. These daily photographs will allow the A/E team members to make note of anything that just doesn't look right, and discuss with the RE or to ask the Contractor to take more specific photos to facilitate discussion. The frequency and type of these photos shall be acceptable to the RE/COR following discussion with the respective A/E team members.

#### **1.27 FINAL ELEVATION DIGITAL IMAGES**

- A. A minimum of four (4) images of each elevation shall be taken with a minimum 12 MP camera, by a professional photographer with different settings to allow the RE/COR to select the image to be printed. All images are provided to the RE on a CD.
- B. Photographs shall be taken upon completion, including landscaping. They shall be taken on a clear sunny day to obtain sufficient detail to show depth and to provide clear, sharp pictures. Pictures shall be 400 mm x 500 mm (16 by 20 inches), printed on regular weight paper, matte finish archival grade photographic paper and produced by a RA4 process from the digital image with a minimum 300 PPI. Identifying data shall be carried on a label affixed to back of the photograph without damage to the photograph and shall be similar to that provided for final construction photographs.
- C. Furnish six (6) 400 mm x 500 mm (16 by 20 inch) color prints of the All Cemetery buildings constructed under this project (elevations as selected by the RE from the images taken above). Photographs shall be artistically composed showing full front elevations. All images shall become property of the Government. Each of the selected six prints shall be place in a frame with a minimum of 2 inches of appropriate matting as a border. Provide a selection of a minimum of 3 different frames from which the SRE will select one style to frame all six prints. Photographs with frames shall be delivered to the RE/COR in boxes suitable for shipping.
  - 1. Entrance sign & wall/fence feature.
  - 2. Rest room building.
  - 3. Committal Service Shelter No. 1.
  - 4. Columbarium Plaza



#### **1.28 HISTORIC PRESERVATION**

- A. Where the Contractor or any of the Contractor's employees, prior to, or during the construction work, are advised of or discover any possible archeological, historical and/or cultural resources, the Contractor shall immediately notify the RE/COR verbally, and then with a written follow up.

#### **1.29 PROJECT HEALTH AND SAFETY PLAN**

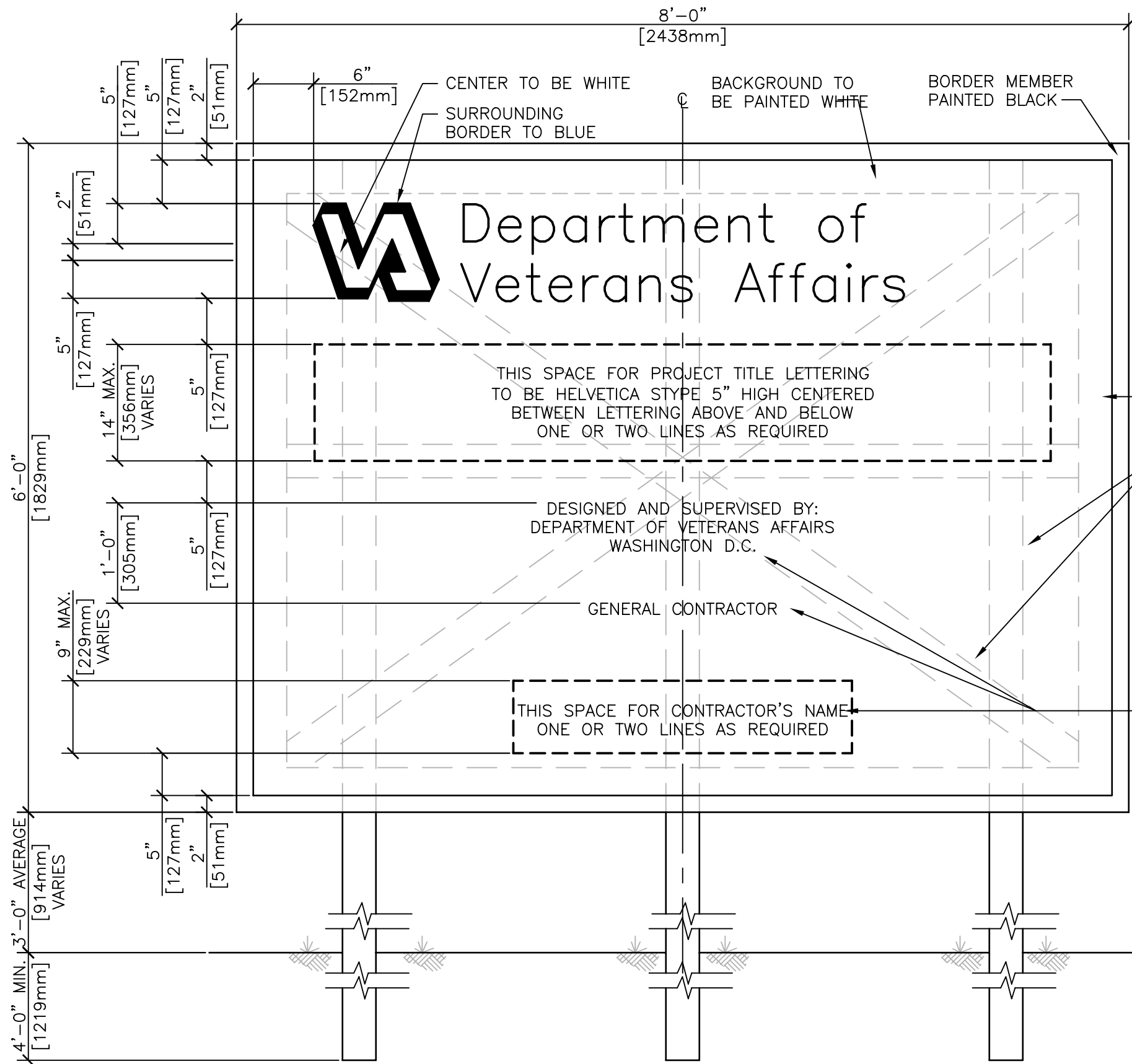
- A. Prior to commencing any construction, submit a site specific Project Health and Safety Plan (PHSP). At a minimum, the PHSP shall cover the following topics:
  - 1. Organizational structure (including Responsible Persons)
  - 2. Site Characterization and Job Hazard Identification
  - 3. Site Control and Security
  - 4. Training
  - 5. Medical Surveillance
  - 6. PPE
  - 7. Exposure Monitoring
  - 8. Heat Stress
  - 9. Spill Containment
  - 10. Decontamination
  - 11. Emergency Response
  - 12. Confined Spaces
  - 13. Hosting Operations
  - 14. Trench Safety
  - 15. Lockout/Tagout

#### **1.30 PROJECT SUSTAINABILITY GOALS**

- A. Develop and distribute copies of the work plan to each subcontractor and the RE/COR. The overall goal for the work plan is to provide a project that meets the functional program needs and incorporates the requirements and principles of sustainability as defined by Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS.
- B. The project goal generally:
  - 1. Preserve and restore the site ecosystem and biodiversity; avoid site degradation and erosion; minimize offsite environmental impact.
  - 2. Use the minimum amount of energy, water, and materials feasible to meet the design intent.
  - 3. Use environmentally preferable products and decrease toxicity level of materials used.

4. Use renewable energy and material resources.
  5. 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.
  6. Manage construction site and storage of materials to ensure no negative impact on the indoor environmental quality of the building.
  7. Reduce construction waste through reuse, recycling, and supplier take-back.
- C. Sustainability is the balance of environmental, economic, and societal considerations.

- - - E N D - - -



ELEVATION

PAINT BORDER  
MEMBER  
BLACK ENAMEL

ALL LETTERING TO BE  
PAINTED BLACK WITH  
EXCEPTION OF PROJECT  
TITLE WHICH IS TO BE  
BLUE

2"x4" [51x102mm]  
FRAME AND BRACES  
IN SAME PLANE

METAL FACE  
WHITE ENAMEL

2"x4" [51x102mm]  
FRAME AND BRACE IN  
BACK

METAL FACE

STRETCH METAL  
FACE TIGHT, TURN  
OVER FRAME AND  
SECURE WITH FLAT  
HEAD DEFORMED  
NAILS.

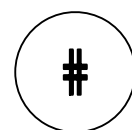
LETTERING TO BE  
HELVETICA STYLE 1 1/2"  
[38mm] HIGH TO BE  
CENTERED HORIZONTAL

NOTE:

ANY SEAM IN METAL TO  
BE FLAT SEAM - SEAMS  
TO BE HORIZONTAL AND  
OCCUR BETWEEN LINES  
OF LETTERING.

4"x4" [102x102mm]  
POSTS PAINTED WHITE

SECTION ON CENTERLINE



CONSTRUCTION SIGN

NTS

DETAIL TITLE / CONSTRUCTION SIGN

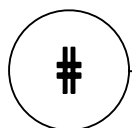
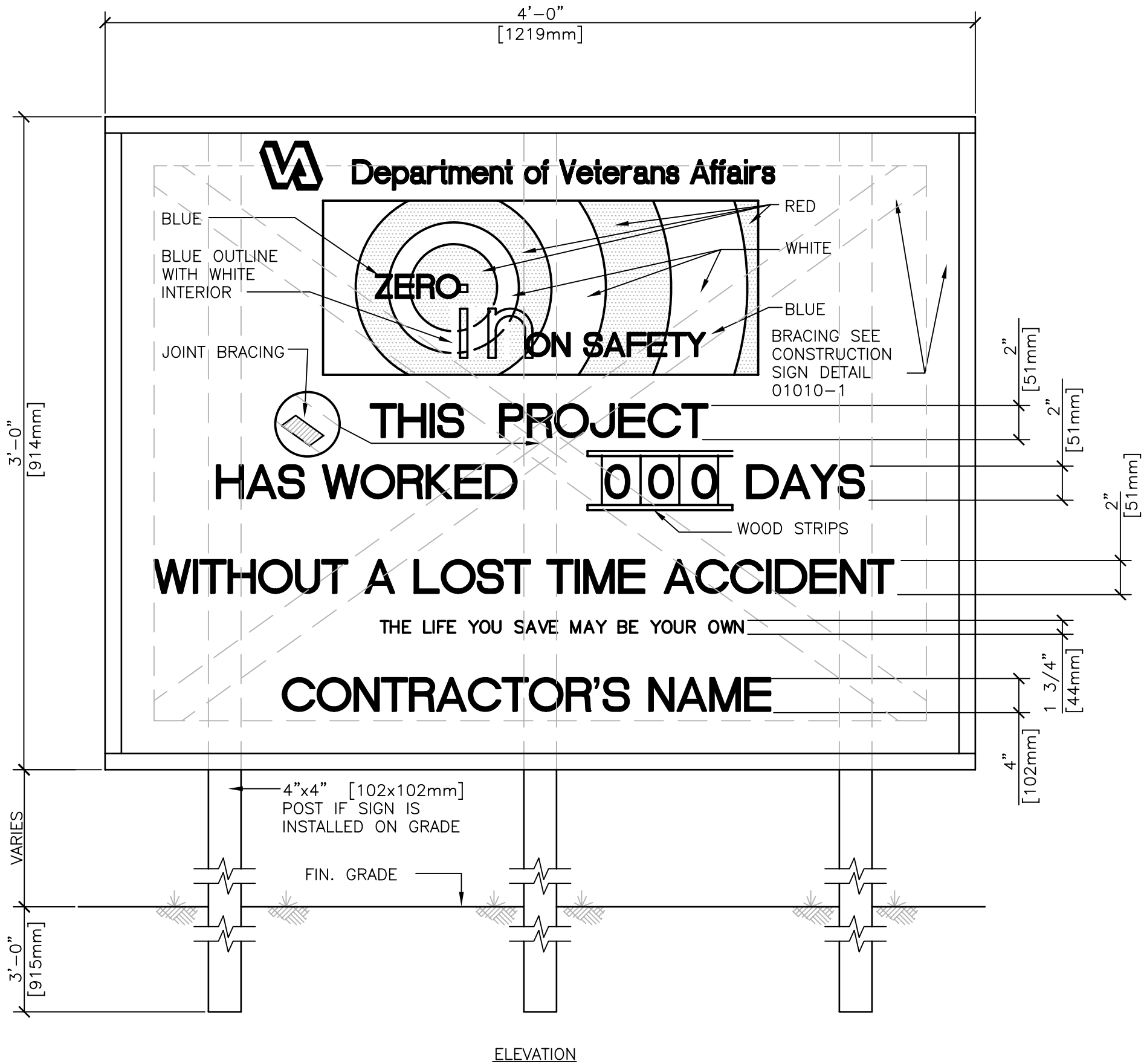
Department of  
Veterans Affairs



SCALE : NONE

DATE ISSUED: DECEMBER 2008

CAD DETAIL NO.: SD010000-1.DWG



**SAFETY SIGN**

NTS

Department of  
Veterans Affairs



DETAIL TITLE / SAFETY SIGN

SCALE : NONE

DATE ISSUED: DECEMBER 2008

CAD DETAIL NO.: SD010000-02.DWG

**SECTION 01 32 16.13**  
**NETWORK ANALYSIS SCHEDULES (NCA)**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

A. The Contractor shall develop a Network Analysis System (NAS) plan and schedule demonstrating fulfillment of the contract requirements, shall keep the network up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) Precedence Diagramming Method (PDM) technique will be utilized to satisfy both time and cost applications. All schedule data and reports required under this specification section shall be based upon regular total float, not relative total float schedules.

**1.2 CONTRACTOR'S REPRESENTATIVE:**

A. The Contractor shall designate an authorized representative in the firm who will be responsible for the preparation of the network diagram, review and report progress of the project with and to the Contracting Officer's representative.

B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section and such authority shall not be interrupted throughout the duration of the project.

**1.3 CONTRACTOR'S CONSULTANT:**

A. To prepare the network diagram, and compact disk(s), which reflects the Contractor's project plan, the Contractor shall engage an independent CPM consultant who is skilled in the time and cost application of scheduling using (PDM) network techniques for construction projects, the cost of which is included in the Contractor's bid. This consultant shall not have any financial or business ties to the Contractor, and shall not be an affiliate or subsidiary company of the Contractor, and shall not be employed by an affiliate or subsidiary company of the Contractor.

- B. Prior to engaging a consultant, and within 10 calendar days after award of the contract, the Contractor shall submit to the Contracting Officer:
1. The name and address of the proposed consultant.
  2. Sufficient information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
  3. A list of prior construction projects, along with selected PDM network diagram samples on current projects which the proposed consultant has performed complete project scheduling services. These network diagram samples must show complete project planning for a project of similar size and scope as covered under this contract.
- C. The Contracting Officer has the right to approve or disapprove employment of the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of information. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor must have their CPM Consultant approved prior to submitting any diagram.

#### **1.4 COMPUTER PRODUCED SCHEDULES**

- A. The contractor shall provide to the VA, Senior Resident Engineer and CPM Schedule Analyst, monthly computer processing of all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of Primavera (P6) to the contracting officer's representative; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data in Primavera (P6) batch format; and the resulting monthly updated schedule in a compressed electronic file in Primavera (P6), (PDM) format. These must be submitted with and substantively support the contractor's monthly payment request and the signed lookahead report. The resident engineer shall identify the five different report formats that the contractor shall provide based upon the monthly schedule updates.

- B. The contractor is responsible for the correctness and timeliness of the computer-produced reports. The Contractor is also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.
- C. The VA shall report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor will reprocess the computer-produced reports and associated compact disk(s), when requested by the Contracting Officer's representative, to correct errors which affect the payment and schedule for the project.

#### **1.5 THE COMPLETE PROJECT NETWORK DIAGRAM SUBMITTAL**

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the complete network diagram on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in a compressed Primavera (P6), (PDM) format. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, duration, predecessor and successor relationships, trade code, area code, description, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start and start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the network diagram shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have a zero duration. The complete working network diagram shall reflect the

Contractor's approach to scheduling the complete project. The final network diagram in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents. These changes/delays shall be entered at the first update after the final network diagram has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

- B. Within 30 calendar days after receipt of the complete project network diagram, the Contracting Officer or his representative, will do one or both of the following:
  - 1. Notify the Contractor concerning his actions, opinions, and objections.
  - 2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised network diagram, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.
- C. The approved baseline network diagram schedule and the corresponding computer-produced schedule(s) shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.
- D. The Complete Project Network Diagram will contain approximately 300work activities/events.

#### **1.6 WORK ACTIVITY/EVENT COST DATA**

- A. The Contractor shall cost load all work activities/events except procurement activities. The cost loading shall reflect the appropriate level of effort of the work activities/events. The



cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. In the event of disapproval, the Contractor shall revise and resubmit in accordance with Article, THE COMPLETE PROJECT NETWORK DIAGRAM SUBMITTAL. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.

- B. The Contractor shall cost load work activities/events for guarantee period services, test, balance and adjust various systems in accordance with the provisions in the FAR 52.232 - 5 (PAYMENTS UNDER FIXED-PRICE CONSTRUCTION), Article, and VAAR 852.236 - 83 (PAYMENTS UNDER FIXED-PRICE CONSTRUCTION).
- C. In accordance with Article PERFORMANCE OF WORK BY THE CONTRACTOR in FAR 52.236 - 1 and VAAR 852.236 - 72, the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.
- D. The Contractor shall cost load work activities/events for ASBESTOS ABATEMENT. The sum of asbestos abatement work activity/event costs shall equal the value of the asbestos bid item in the Contractors' bid.
- E. The Contractor shall cost load work activities/events for all BID ITEMS. The sum of the cost loading for each bid item work activities/events shall equal the value of the item in the Contractors' bid.
- F. Work activities/events for Contractor bond shall have a trade code and area code of BOND.

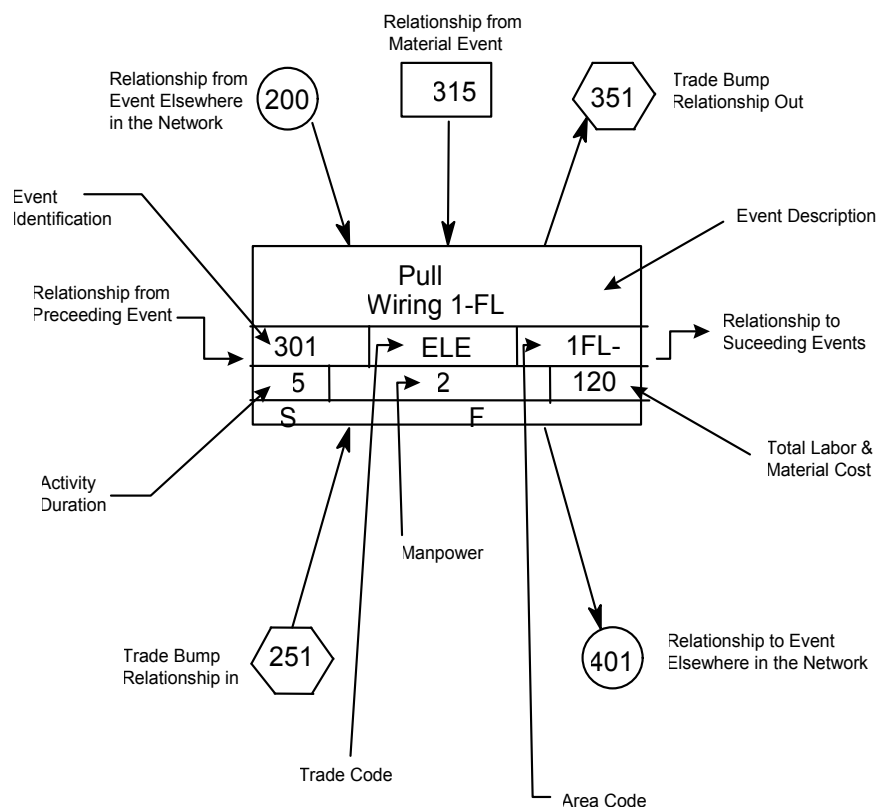
**1.7 NETWORK DIAGRAM REQUIREMENTS**

- A. Show on the network diagram the sequence and interdependence of work activities/events required for complete performance of all items of work. In preparing the network diagram, the Contractor shall:
1. Exercise sufficient care to produce a clear, legible and accurate network diagram, refer to the drawing, CPM-1 (Sample CPM Network). Computer plotted network diagrams shall legibly display and plot all information required by the VA CPM activity/event legend or the computer plotted network diagram will not be acceptable. If the computer plotted network diagram is not found acceptable by the contracting officer's representative, then the network diagram will need to be hand drafted and meet legibility requirements. Group activities related to specific physical areas of the project, on the network diagram for ease of understanding and simplification. Provide a key plan on each network diagram sheet showing the project area associated with the work activities/events shown on that sheet.
  2. Show the following on each work activity/event:
    - a. Activity/Event ID number.
    - b. Concise description of the work represented by the activity/event. (35 characters or less including spaces preferred).
    - c. Performance responsibility or trade code (five alpha characters or less): GEN, MECH, ELEC, CARP, PLAST, or other acceptable abbreviations.
    - d. Duration (in work days.)
    - e. Cost (in accordance with Article, ACTIVITY/EVENT COST DATA of this section and less than \$9,999,999 per activity).
    - f. Work location or area code (five characters or less), descriptive of the area involved.
    - g. Manpower required (average number of men per day).
    - h. The SYMBOL LEGEND format shown below and on the drawing, CPM-1 (Sample CPM Network) is mandatory and shall be followed in

preparing final network diagrams.

## SYMBOL LEGEND

Show Network Diagram page number location(s) for all incoming/outgoing node connector(s).



3. Show activities/events as:

- a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
- b. Contracting Officer's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
- c. Interruption of VA Facility utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
- d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.

- e. Work activities/events for the asbestos abatement bid item shall have a trade code of ASB.
  - f. Bid items other than the Base Bid (ITEM 1) and Asbestos Abatement item shall have trade codes corresponding to the appropriate bid item number (e.g., ITM 3, ITM 4 and other items).
- 4. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
  - 5. Break up the work into activities/events of a duration no longer than 20 work days each, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the Contracting Officer may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals shall not be less than 20 work days. Refer to drawing CPM-1 for VA approval activities/events which will require minimum duration longer than 20 workdays. The construction time as determined by the CPM schedule from early start to late finish for any sub-phase, phase or the entire project shall not exceed the contract time(s) specified or shown.
  - 6. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
  - 7. Uniquely number each activity/event with numbers ranging from 1 to 99998 only. The network diagram should be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. Submit the following supporting data in addition to the network diagram, activity/event ID schedule and electronic file (s). Failure

of the Contractor to include this data will delay the review of the submittal until the Contracting Officer is in receipt of the missing data:

1. The proposed number of working days per week.
  2. The holidays to be observed during the life of the contract (by day, month, and year).
  3. The planned number of shifts per day.
  4. The number of hours per shift.
  5. List the major construction equipment to be used on the site, describing how each piece relates to and will be used in support of the submitted network diagram work activities/events.
  6. Provide a typed, doubled spaced, description, at least one page in length, of the plan and your approach to constructing the project.
- C. To the extent that the network diagram or any revised network diagram shows anything not jointly agreed upon, it shall not be deemed to have been approved by the Contracting Officer. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the Contracting Officer's approval of the network diagram.
- D. Compact Disk Requirements and CPM Activity/Event Record
- Specifications: Submit to the VA (Senior resident Engineer and CPM Schedule Analyst) an electronic file(s) containing one file of the data required to produce a Primavera (P6), (PDM) produced schedule, reflecting all the activities/events of the complete project network diagram being submitted.

#### **1.8 PAYMENT TO THE CONTRACTOR:**

- A. Monthly, the contractor shall submit the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article FAR 52.232 - 5 (PAYMENTS UNDER FIXED-PRICE CONSTRUCTION), and VAAR 852.236 - 83 (PAYMENTS UNDER FIXED-PRICE CONSTRUCTION). The Contractor is entitled to a monthly progress payment upon approval of estimates

as determined from the currently approved updated computer-produced calendar-dated schedule unless, in special situations, the Contracting Officer permits an exception to this requirement. Monthly payment requests shall include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of Primavera (P6), (PDM) to the contracting officer's representative; a listing of all project schedule changes, and associated data, made at the update; and an electronic file (s) of the resulting monthly updated schedule in a compressed Primavera (P6), (PDM) format. These must be submitted with and substantively support the contractor's monthly application and certificate for payment request documents.

- B. When the Contractor fails or refuses to furnish to the Contracting Officer the information and the associated updated Primavera (P6), (PDM) schedule in electronic format, which, in the sole judgment of the Contracting Officer, is necessary for processing the monthly progress payment, the Contractor shall not be deemed to have provided an estimate and supporting schedule data upon which progress payment may be made.

#### **1.9 PAYMENT AND PROGRESS REPORTING**

- A. Monthly job site progress meetings shall be held on dates mutually agreed to by the Contracting Officer (or Contracting Officer's representative) and the Contractor. Contractor and the CPM consultant will be required to attend all monthly progress meetings. Presence of Subcontractors during progress meeting is optional unless required by the Contracting Officer (or Contracting Officer's representative). The Contractor shall update the project schedule and all other data required by this section shall be accurately filled in and completed prior to the monthly progress meeting. The Contractor shall provide this information to the Contracting Officer or the VA representative in completed form three work days in advance of the progress meeting. Job progress will be reviewed to verify:
  - 1. Actual start and/or finish dates for updated/completed activities/events.
  - 2. Remaining duration, required to complete each activity/event started, or scheduled to start, but not completed.

3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the network diagram and computer-produced schedules. Changes in activity/event sequence and duration which have been made pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
  4. Percentage for completed and partially completed activities/events.
  5. Logic and duration revisions required by this section of the specifications.
  6. Activity/event duration and percent complete shall be updated independently.
- B. The Contractor shall submit a narrative report as a part of his monthly review and update, in a form agreed upon by the Contractor and the Contracting Officer. The narrative report shall include a description of problem areas; current and anticipated delaying factors and their estimated impact on performance of other activities/events and completion dates; and an explanation of corrective action taken or proposed. This report is in addition to the daily reports pursuant to the provisions of Article, DAILY REPORT OF WORKERS AND MATERIALS in the GENERAL CONDITIONS.
- C. After completion of the joint review and the Contracting Officer's approval of all entries, the contractor will generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.
- D. After completing the monthly schedule update, the contractor's scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and resident engineer for the contract change(s). When there is a disagreement on logic and/or durations, the consultant shall use the schedule logic and/or durations provided and approved by the resident engineer. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in

accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the resident engineer within fourteen (14) calendar days of completing the regular schedule update. Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.

- E. After VA acceptance and approval of the final network diagram, and after each monthly update, the contractor shall submit to the Contracting Officer three blue line copies of a revised complete network diagram showing all completed and partially completed activities/events, contract changes and logic changes made on the intervening updates or at the first update on the final diagram. The Contracting Officer may elect to have the contractor do this on a less frequent basis, but it shall be done on a quarterly basis as a minimum.
- F. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions



should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

#### **1.10 RESPONSIBILITY FOR COMPLETION**

- A. Whenever it becomes apparent from the current monthly progress review meeting or the monthly computer-produced calendar-dated schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
  - 1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
  - 2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
  - 3. Reschedule the work in conformance with the specification requirements.
- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the Contracting Officer for the proposed schedule changes. If such actions are approved, the CPM revisions shall be incorporated by the Contractor into the network diagram before the next update, at no additional cost to the Government.

#### **1.11 CHANGES TO NETWORK DIAGRAM AND SCHEDULE**

- A. Within 30 calendar days after VA acceptance and approval of any updated computer-produced schedule, the Contractor will submit a revised network diagram, the associated compact disk(s), and a list of any activity/event changes including predecessors and successors for any of the following reasons:
  - 1. Delay in completion of any activity/event or group of activities/events, indicate an extension of the project completion by 20 working days or 10 percent of the remaining project duration, whichever is less. Such delays which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM

as the direct cause for delaying the project beyond the acceptable limits.

2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
  3. The schedule does not represent the actual prosecution and progress of the project.
  4. When there is, or has been, a substantial revision to the activity/event costs of the network diagram regardless of the cause for these revisions.
- B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, must be furnished in writing to the Contracting Officer for approval.
- C. Contracting Officer's approval for the revised network diagram and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.
- D. The cost of revisions to the network diagram resulting from contract changes will be included in the proposal for changes in work as specified in Article, FAR 52.243 -4 (CHANGES), VAAR 852.236 - 88 (CHANGES - SUPPLEMENTS), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.
- E. The cost of revisions to the network diagram not resulting from contract changes is the responsibility of the Contractor.

#### **1.12 ADJUSTMENT OF CONTRACT COMPLETION**

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the Contracting Officer may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any

approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.

- B. Actual delays in activities/events which, according to the computer-produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under Article, FAR 52.243 -4 (CHANGES), VAAR 852.236 - 88 (CHANGES - SUPPLEMENTS). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.
- D. All delays due to non-work activities/events such as RFI's, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.
  - 1. Delay attributed to unusually severe weather must be supported by climatological data covering the period in question, as well as the same period for the ten preceding years. When the weather condition in question exceeds the ten-year average in intensity or frequency, the excess experienced is considered to be "unusually severe." Comparison is normally on a monthly basis and because contract time is based upon calendar days, the days of the week are immaterial. Whether or not unusually severe weather delays the work would depend upon its effect on the work under way at the time and whether or not the effected work activities are on a critical path.

2. For RFI's, strikes and similar non-work activities/events, the contractor shall submit to the SRE a report for the time the contract as a whole was delayed. This report shall give the dates the delay began and ended, the cause of the delay, the particular part or parts of work affected, and the number of calendar days the delay affected the completion date of the contract as a whole.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

- - - END - - -

**SECTION 01 33 23**  
**SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES**

- 1.1 Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- 1.2 For the purposes of this contract, samples (including laboratory samples to be tested), test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1.3 Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
  - A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
  - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
  - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- 1.4 Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals (including any laboratory samples to be tested) will not serve as a basis for extending contract time for completion.
- 1.5 Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Resident Engineer on behalf of the Contracting Officer.
- 1.6 Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

- 1.7 The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.
- 1.8 Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect- Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1.9 Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
  - A. Submit samples required by Section 09 06 00, SCHEDULE FOR FINISHES, in quadruplicate. Submit other samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.
  - B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Cemetery, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
    1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.

2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Cemetery, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.

C. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory Tests (those preceded by symbol "LT" under the separate sections of the specification shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.

1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.
2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
4. Contractor shall send a copy of transmittal letter to both Resident Engineer and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
5. Contractor shall forward a copy of transmittal letter to Resident Engineer simultaneously with submission to a commercial testing laboratory.
6. Laboratory test reports shall be sent directly to Resident Engineer for appropriate action.
7. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.

8. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.

D. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.

E. Approved samples will be kept on file by the Resident Engineer at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.

F. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.

1. For each drawing required, submit one legible photographic paper or vellum reproducible.
2. Reproducible shall be full size.
3. Each drawing shall have marked thereon, proper descriptive title, including Cemetery location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.



7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- 1.10 Samples // (except laboratory samples), // shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to
- a. Leo Daly; Olanning, Architecture, Engineering, & Interiors
  - b. 550 South Hope Street, 27<sup>th</sup> Floor
  - c. Los Angeles, California 90071
- 1.11 At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the Resident Engineer.

- - - END - - -

**SECTION 01 42 19**  
**REFERENCE STANDARDS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

**1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)**

- A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to - GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.
- B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

**1.3 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-4) (JUN 1988)**

- A. The specifications and standards cited in this solicitation can be examined at the following location:
- B. United States Department of Veteran Affairs
- C. Technical Information Library  
<http://www.cfm.va.gov/til/>

**1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)**

- A. The specifications cited in this solicitation may be obtained from the associations or organizations listed below.
- B. AA Aluminum Association, Inc.  
<http://www.aluminum.org>
- C. AABC Associated Air Balance Council  
<http://www.aabchq.com>
- D. AADM American Association of Automatic Door Manufacturers  
<http://www.aaadm.com>
- E. AATC American Association of Textile Chemists and Colorist  
<http://www.aatcc.org>
- F. AAMA American Architectural Manufacturer's Association  
<http://www.aamanet.org>
- G. AAN American Nursery and Landscape Association  
<http://www.anla.org>
- H. AASHTO American Association of State Highway and Transportation Officials  
<http://www.transportation.org/Pages/default.aspx>
- I. ACGIH American Conference of Governmental Industrial Hygienists  
<http://www.acgih.org>
- J. ACI American Concrete Institute  
<http://www.aci-int.net>
- K. ACPA American Concrete Pipe Association  
<http://www.concrete-pipe.org>
- L. ACPPA American Concrete Pressure Pipe Association  
<http://www.acppa.org>
- M. ADA American with Disabilities Act  
<http://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/background/adaag>
- N. ADC Air Diffusion Council  
<http://flexibleduct.org>
- O. AGA American Gas Association  
<http://www.aga.org>

- P. AGC Associated General Contractors of America  
<http://www.agc.org>
- Q. AHA American Hardboard Association  
<http://www.domensino.com/AHA/>
- R. AIHA American National Standards Institute/American Industrial Hygiene Association  
<http://www.aiha.org/Pages/default.aspx>
- S. AISC American Institute of Steel Construction  
<http://www.aisc.org>
- T. AISI American Iron and Steel Institute  
<http://www.steel.org>
- U. AITC American Institute of Timber Construction  
<http://www.aitc-glulam.org>
- V. ALI Automotive Lift Institute  
<http://www.autolift.org/>
- W. AMCA Air Movement and Control Association  
<http://www.amca.org/>
- X. ANLA American Nursery & Landscape Association  
<http://www.anla.org>
- Y. ANSI American National Standards Institute, Inc.  
<http://www.ansi.org>
- Z. APA Architectural Precast Association  
<http://www.archprecast.org/>
- AA. APA The Engineered Wood Association  
<http://www.apawood.org>
- BB. ARI Air-Conditioning and Refrigeration Institute  
<http://www.lightindustries.com/ARI/>
- CC. ARMA Asphalt Roofing Manufacturers Association  
<http://www.asphaltroofing.org/>
- DD. ASAE American Society of Agricultural Engineers  
<http://www.asabe.org>
- EE. ASCE American Society of Civil Engineers  
<http://www.asce.org>

- FF. ASHRAE American Society of Heating, Refrigerating, and  
Air-Conditioning Engineers  
<http://www.ashrae.org>
- GG. ASME American Society of Mechanical Engineers  
<http://www.asme.org>
- HH. ASSE American Society of Sanitary Engineering  
<http://www.asse-plumbing.org>
- II. ASTM American Society for Testing and Materials  
<http://www.astm.org>
- JJ. AWI Architectural Woodwork Institute  
<http://www.awinet.org>
- KK. AWS American Welding Society  
<http://www.aws.org>
- LL. AWPA American Wood Protection Association  
<http://www.awpa.com>
- MM. AWWA American Water Works Association  
<http://www.awwa.org>
- NN. BHMA Builders Hardware Manufacturers Association  
<http://www.buildershardware.com>
- OO. BIA The Brick Industry Association  
<http://www.bia.org>
- PP. CAGI Compressed Air and Gas Institute  
<http://www.cagi.org>
- QQ. CARB California Environmental Protection Agency Air Resources  
Board  
<http://arb.ca.gov/hompage.html/>
- RR. CFR Code of Federal Regulations  
<http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR>
- SS. CGA Compressed Gas Association, Inc.  
<http://www.cganet.com>
- TT. CID Commercial Item Description  
<http://www.gsa.gov/portal/content/100847>

- UU. CISCA      Ceilings and Interior Systems Construction Association  
<http://www.cisca.org>
- VV. CISPI      Cast Iron Soil Pipe Institute  
<http://www.cispi.org>
- WW. CLFMI      Chain Link Fence Manufacturers Institute  
<http://www.chainlinkinfo.org>
- XX. CPA Composite Panel Association  
<http://www.compositepanel.org/>
- YY. CRA California Redwood Association  
<http://www.calredwood.org>
- ZZ. CRI Carpet and Rug Institute  
<http://www.carpet-rug.com>
- AAA.    CRRC    Cool Roof Rating System  
<http://coolroofs.org/>
- BBB.    CRSI    Concrete Reinforcing Steel Institute  
<http://www.crsi.org>
- CCC.    CSI    Cast Stone Institute  
<http://www.caststone.org>
- DDD.    DASMA Door and Access Systems Manufacturers Association  
<http://www.dasma.com/>
- EEE.    DHI    Door and Hardware Institute  
<http://www.dhi.org>
- FFF.    DOE    U.S. Department of Energy  
<http://www.energy.gov/>
- GGG.    EEI    Edison Electric Institute  
<http://www.eei.org>
- HHH.    EGSA    Electrical Generating Systems Association  
<http://www.egsa.org>
- III.    EIMA    Exterior Insulation Manufacturers Association  
<http://www.eima.com/>
- JJJ.    EPA    Environmental Protection Agency  
<http://www.epa.gov>
- KKK.    ETL    ETL Testing Laboratories, Inc.  
<http://www.envirotestinglabs.com/>

LLL. FCC Federal Communications Commission  
<http://www.fcc.gov>

MMM. FHA Federal Highway Administration  
<http://www.fhwa.dot.gov/>

NNN. FM FM Global  
<http://www.fmglobal.com>

OOO. FPS The Forest Products Society  
<http://www.forestprod.org>

PPP. FSC Forest Stewardship Council  
<http://www.fscus.org>

QQQ. GA Gypsum Association  
<http://www.gypsum.org>

RRR. GANA Glass Association of North America  
<http://www.glasswebsite.com>

SSS. GBI Green Building Initiative  
<http://www.thegbi.org/>

TTT. GS Green Seal  
<http://www.greenseal.org>

UUU. GSA General Services Administration  
<http://www.gsa.gov>

VVV. HI Hydraulic Institute  
<http://www.pumps.org>

WWW. HPVA Hardwood Plywood & Veneer Association  
<http://www.hpva.org>

XXX. ICC The International Code Council  
<http://www.iccsafe.org/Pages/default.aspx>

YYY. ICEA Insulated Cable Engineers Association Inc.  
<http://www.icea.net>

ZZZ. IEEE Institute of Electrical and Electronics Engineers  
**Error! Hyperlink reference not valid.**

AAAA. IGMA Insulating Glass Manufacturers Alliance  
<http://www.igmaonline.org>

BBBB. ITS Intertek Training Services  
<http://www.intertek.com/>

CCCC. MBMA Metal Buildings Manufacturers Association  
<http://www.mbma.com>

DDDD. MHI Material Handling Industry of America  
<http://www.mhi.org/>

EEEE. MIA Marble Institute of America  
<http://www.marble-institute.com/>

FFFF. MIC Masonry Industry Council

GGGG. MPI Master Painters Institute  
<http://www.mpi.net/>

HHHH. MSJC Masonry Standards Joint Committee  
<http://www.masonrysociety.org/msjc/>

IIII. NAAMM National Association of Architectural Metal Manufacturers  
<http://www.naamm.org>

JJJJ. NAPHCC Plumbing-Heating-Cooling Contractors Association  
<http://www.phccweb.org/>

KKKK. NBS National Bureau of Standards  
See - NIST

LLLL. NEC National Electric Code  
See - NFPA National Fire Protection Association

MMMM. NEMA National Electrical Manufacturers Association  
<http://www.nema.org>

NNNN. NFPA National Fire Protection Association  
<http://www.nfpa.org>

OOOO. NFRC National Fenestration Rating Council  
<http://www.nfrc.org/>

PPPP. NHLA National Hardwood Lumber Association  
<http://www.natlhardwood.org>

QQQQ. NIH National Institute of Health  
<http://www.nih.gov>

RRRR. NIOSH The National Institute for Occupational Safety and Health  
<http://www.cdc.gov/niosh/>

SSSS. NIST National Institute of Standards and Technology  
<http://www.nist.gov>

TTTT. NLMA Northeastern Lumber Manufacturers Association, Inc.  
<http://www.nelma.org>

## REFERENCE STANDARDS



- UUUU. NPA National Particleboard Association  
18928 Premiere Court  
Gaithersburg, MD 20879  
(301) 670-0604
- VVVV. NPCA National Precast Concrete Association  
<http://www.precast.org>
- WWWW. NRCA National Roofing Contractors Association  
<http://www.nrca.net>
- XXXX. NSF National Sanitation Foundation  
<http://www.nsf.org>
- YYYY. NSF NSF International  
<http://www.nsf.org/>
- ZZZZ. NTMA National Terrazzo and Mosaic Association  
<http://ntma.com/>
- AAAA. NWWDA Window and Door Manufacturers Association  
<http://www.nwwda.org>
- BBBB. OSHA Occupational Safety and Health Administration  
Department of Labor  
<http://www.osha.gov>
- CCCC. PCA Portland Cement Association  
<http://www.cement.org/>
- DDDD. PCI Precast Prestressed Concrete Institute  
<http://www.pci.org>
- EEEE. PPI The Plastic Pipe Institute  
<http://www.plasticpipe.org>
- FFFF. PEI Porcelain Enamel Institute, Inc.  
<http://www.porcelainenamel.com>
- GGGG. PTI Post-Tensioning Institute  
<http://www.post-tensioning.org>
- HHHH. RCSC Research Council of Structural Connections  
<http://www.boltcouncil.org/>
- IIII. RFCI The Resilient Floor Covering Institute  
<http://www.rfci.com>
- JJJJ. RIS Redwood Inspection Service  
See - CRA

REFERENCE STANDARDS

KKKKK. RMA Rubber Manufacturers Association, Inc.  
<http://www.rma.org>

LLLLL. SCAQMD South Coast Air Quality Management District  
<http://www.aqmd.gov>

MMMMM. SCMA Southern Cypress Manufacturers Association  
<http://www.cypressinfo.org>

NNNNN. SDI Steel Deck Institute  
<http://www.sdi.org>

OOOOO. SDI Steel Door Institute  
<http://www.steeldoor.org>

PPPPP. SEI Structural Engineering Institute  
<http://www.asce.org/SEI/>

QQQQQ. SJI Steel Joist Institute  
<http://www.steeljoist.org>

RRRRR. SMACNA Sheet Metal and Air-Conditioning Contractors  
National Association, Inc.  
<http://www.smacna.org>

SSSSS. SPRI Single Ply Roofing Industry  
<http://www.spri.org>

TTTTT. SSPC The Society for Protective Coatings  
<http://www.sspc.org>

UUUUU. STI Steel Tank Institute  
<http://www.steeltank.com>

VVVVV. SWI Steel Window Institute  
<http://www.steelwindows.com>

WWWWW. SWRI Sealant Waterproofing and Restoration Institute  
<http://www.swrionline.org/>

XXXXX. TCNA Tile Council of North America, Inc.  
<http://www.tileusa.com>

YYYYY. TPI Truss Plate Institute, Inc.  
**Error! Hyperlink reference not valid.**[www.tpinst.org/](http://www.tpinst.org/)

ZZZZZ. UL Underwriters' Laboratories Incorporated  
<http://www.ul.com>

AAAAAA.ULC Underwriters' Laboratories of Canada

<http://www.ulc.ca>

BBBBBB.USDA U.S. Department of Agriculture

<http://www.usda.gov>

CCCCCC.USGBC U.S. Green Building Council

<http://www.usgbc.org>

DDDDDD.WCLIB West Coast Lumber Inspection Bureau

<http://www.wclib.org/>

EEEEEE.WDMA Window and Door Manufacturers Association

<https://www.wdma.com/>

FFFFFF.WH Warnock Hersey

<http://www.intertek.com/marks/wh/>

GGGGGG.WRCLA Western Red Cedar Lumber Association

<http://www.wrcla.org/>

HHHHHH.WWPA Western Wood Products Association

<http://www2.wwpa.org/>

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

- - - END - - -

## SECTION 01 45 00

## QUALITY CONTROL

## PART 1 GENERAL

## 1.1 REFERENCES

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

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

ASHRAE 52.2 (2007; Addenda B 2008; Errata 2009, Errata 2010; INT 2010; Errata 2011) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

ASTM INTERNATIONAL (ASTM)

ASTM D6245 (2007) Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation

ASTM D6345 (2010) Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

ANSI/SMACNA 008 (2007) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition

## 1.2 SUBMITTALS

Government approval by the SRE/CO is required for submittals with a "G" designation. Submittals not having a "G" designation are for Contractor Quality Control approval. Government reserves the right to review and comment on submittals not having a "G" designation. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES and Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES as applicable:

SD-01 Preconstruction Submittals

Construction Quality Control (QC) Plan; G

Submit a Construction QC Plan prior to start of construction.

## QUALITY CONTROL

### 1.3 INFORMATION FOR THE SENIOR RESIDENT ENGINEER/CONTRACTING OFFICER (SRE/CO)

Prior to commencing work on construction, the Contractor can obtain a single copy set of the current report forms from the SRE/CO. The report forms will consist of the Contractor Production Report, 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 (SRE/CO) during Construction:

- a. CQC Report: Mail or hand-carry the original (wet signatures) and one copy by 10:00 AM the next working day after each day that work is performed and for every 7 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 7 consecutive calendar days of no-work. Mail or hand-carry the original (wet signatures) and one copy by 10:00 AM the next working day after each day that work is performed and for every 7 consecutive calendar days of no-work, attached to the CQC Report.
- 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.
- 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".

QUALITY CONTROL

01 45 00-2

#### 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 VA objectives. The QC program consists of a QC Organization, QC Plan, QC Plan Meeting(s), a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review and approval, testing, completion inspections, and QC certifications and documentation necessary to provide materials,

equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. The QC program must cover on-site and off-site work and be keyed to the work sequence. No construction work or testing may be performed unless the QC Manager is on the work site. The QC Manager must report to an officer of the firm and not be subordinate to the Project Superintendent or the Project Manager. The QC Manager, Project Superintendent and Project Manager must work together effectively. Although the QC Manager is the primary individual responsible for quality control, all individuals will be held responsible for the quality of work on the job.

#### 1.4.1 Commissioning

a. NOT USED

#### 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 (SRE/CO) 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 (SRE/CO) 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 (SRE/CO). The (SRE/CO) 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 (SRE/CO), 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 (SRE/CO).

### 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 shall report directly to the Project Manager and Company President. The QC Manager shall be on-site when work is being performed by the prime and/or sub-contractors. The QC Manager shall document all non-conforming conditions, items and/or workmanship.

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 including all Subcontractors.

#### 1.5.1.2 Qualifications

An individual with a minimum of 5 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 have experience in the areas of hazard identification, safety compliance, and sustainability.

#### 1.5.2 Contractor's Commissioning Coordinator (CCC)

NOT USED

#### 1.5.3 Contractor's LEED Coordinator (CLC)

NOT USED

#### 1.5.4 LEED Administrator

NOT USED

#### 1.5.5 Commissioning Authority

NOT USED

#### 1.5.6 LEED Commissioning Authority

NOT USED

#### 1.5.7 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 agencies for information on the next scheduled class.

#### 1.5.8 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

QUALITY CONTROL

01 45 00-5



## 1.6.1 Construction Quality Control (QC) Plan

### 1.6.1.1 Requirements

Provide, for acceptance by the (SRE/CO), a Construction QC Plan submitted in a three-ring binder that includes a table of contents, with major sections identified with tabs, with pages numbered sequentially, and that documents the proposed methods and responsibilities for accomplishing commissioning activities during the construction of the project:

- a. QC ORGANIZATION: A chart showing the QC organizational structure.
- b. NAMES AND QUALIFICATIONS: Names and qualifications, in resume format, for each person in the QC organization. Include the CQM for Contractors course certifications for the QC Manager and Alternate QC Manager as required by the paragraphs entitled "Construction Quality Management Training" and "Alternate QC Manager Duties and Qualifications".
- c. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL: Duties, responsibilities, and authorities of each person in the QC organization.
- d. OUTSIDE ORGANIZATIONS: A listing of outside organizations, such as architectural and consulting engineering firms, that will be employed by the Contractor and a description of the services these firms will provide.
- e. APPOINTMENT LETTERS: Letters signed by an officer of the firm appointing the QC Manager and Alternate QC Manager and stating that they are responsible for implementing and managing the QC program as described in this Contract. Include in this letter the responsibility of the QC Manager and Alternate QC Manager to implement and manage the three phases of control, and their authority to stop work which is not in compliance with the Contract. 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 for completeness 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: Not Applicable.
- 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: Not Applicable.
- p. ORGANIZATION AND PERSONNEL CERTIFICATIONS LOG: Procedures for coordinating, tracking and documenting all certifications on Subcontractors, testing laboratories, suppliers, personnel, etc. QC Manager will ensure that certifications are current, appropriate for the work being performed, and will not lapse during any period of the contract that the work is being performed.

#### 1.7 QC PLAN MEETINGS

Prior to submission of the QC Plan, the QC Manager will meet with the (SRE/CO) to discuss the QC Plan requirements of this Contract. The purpose of this meeting is to develop a mutual understanding of the QC Plan requirements prior to plan development and submission and to agree on the Contractor's list of DFOWs.

#### 1.8 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan, and prior to the start of construction, the QC Manager will meet with the (SRE/CO) to present the QC program required by this Contract. When a new QC Manager is appointed, the coordination and mutual understanding meeting shall be repeated.

##### 1.8.1 Purpose

The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, design intent, Cx, environmental requirements and procedures, coordination of activities to be performed, and the coordination of the Contractor's management, production, and QC personnel. At the meeting, the Contractor will be required to explain in detail how three phases of control will be implemented for each DFOW, as well as how each DFOW will be affected by each management plan or requirement as listed below:

- a. Waste Management Plan.
- b. Procedures for noise and acoustics management.
- c. Environmental Protection Plan.
- d. Environmental regulatory requirements.

#### 1.8.2 Coordination of Activities

Coordinate activities included in various sections to assure efficient and orderly installation of each component. Coordinate operations included under different sections that are dependent on each other for proper installation and operation. Schedule construction operations with consideration for indoor air quality as specified in the IAQ Management Plan.

#### 1.8.3 Attendees

As a minimum, the Contractor's personnel required to attend include an officer of the firm, the Project Manager, Project Superintendent, QC Manager, Alternate QC Manager, A/E, CA, Environmental Manager, and Subcontractor representatives. Each Subcontractor who will be assigned QC responsibilities shall have a principal of the firm at the meeting. Minutes of the meeting will be prepared by the QC Manager and signed by the Contractor and the (SRE/CO). Provide a copy of the signed minutes to all attendees and shall be included in the QC Plan.

#### 1.9 QC MEETINGS

After the start of construction, conduct QC meetings once every two weeks 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 (SRE/CO) within two working days after the meeting. The (SRE/CO) 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.

#### 1.10 DESIGN REVIEW AND DOCUMENTATION

NOT USED

#### 1.11 THREE PHASES OF CONTROL

Adequately cover both on-site and off-site work with the Three Phases of Control and include the following for each DFOW.

##### 1.11.1 Preparatory Phase

Notify the (SRE/CO) 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 shall attend the preparatory phase meeting. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report and in the Preparatory Phase Checklist. Perform the following prior to beginning work on each DFOW:

- a. Review each paragraph of the applicable specification sections.
- b. Review the Contract drawings.
- c. Verify that field measurements are as indicated on construction and/or shop drawings before confirming product orders, in order to minimize waste due to excessive materials.
- d. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required.
- e. Review the testing plan and ensure that provisions have been made to provide the required QC testing.
- f. Examine the work area to ensure that the required preliminary work has been completed.
- g. Coordinate the schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

- h. Arrange for the return of shipping/packaging materials, such as wood pallets, where economically feasible.
- i. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data.
- j. Discuss specific controls used and construction methods, construction tolerances, workmanship standards, and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each DFOW.
- k. Review the APP and appropriate Activity Hazard Analysis (AHA) to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.

#### 1.11.2 Initial Phase

Notify the (SRE/CO) at least two work days in advance of each initial phase. When construction crews are ready to start work on a DFOW, conduct the initial phase with the Project Superintendent, and the foreman responsible for that DFOW. Observe the initial segment of the DFOW to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily CQC Report and in the Initial Phase Checklist. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each DFOW:

- a. Establish the quality of workmanship required.
- b. Resolve conflicts.
- c. Ensure that testing is performed by the approved laboratory.
- d. Check work procedures for compliance with the APP and the appropriate AHA to ensure that applicable safety requirements are met.

#### 1.11.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary, until the completion of each DFOW and document in the daily CQC Report:

- a. Ensure the work is in compliance with Contract requirements.
- b. Maintain the quality of workmanship required.
- c. Ensure that testing is performed by the approved laboratory.
- d. Ensure that rework items are being corrected.
- e. Assure manufacturers representatives have performed necessary inspections if required and perform safety inspections.

#### 1.11.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same DFOW if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a DFOW is resumed after substantial period of inactivity, or if other problems develop.

#### 1.11.5 Notification of Three Phases of Control for Off-Site Work

Notify the (SRE/CO) at least two weeks prior to the start of the preparatory and initial phases.

#### 1.12 SUBMITTAL REVIEW AND APPROVAL

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

#### 1.13 TESTING

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

##### 1.13.1 Accreditation Requirements

Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (E 329, C 1077, D 3666, D 3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the Corporate Office.

##### 1.13.2 Laboratory Accreditation Authorities

Laboratory Accreditation Authorities include the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology at <http://ts.nist.gov/ts/htdocs/210/214/214.htm>, the American Association of State Highway and Transportation Officials (AASHTO) program at <http://www.transportation.org/aashto/home.nsf/frontpage>, International Accreditation Services, Inc. (IAS) at <http://www.iasonline.org>, U. S. Army Corps of Engineers Materials Testing Center (MTC) at <http://www.wes.army.mil/SL/MTC/>, the American Association for Laboratory Accreditation (A2LA) program at <http://www.a2la.org/>, the Washington Association of Building Officials (WABO) at <http://www.wabo.org/> (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) at <http://www.wacel.org/labaccred.html> (Approval authority by WACEL is limited to projects within Facilities Engineering Command (FEC) Washington geographical area).

##### 1.13.3 Capability Check

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

#### 1.13.4 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify the (SRE/CO) 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 (SRE/CO) via the QC Manager. Furnish a summary report of field tests at the end of each month, per the paragraph entitled "INFORMATION FOR THE CONTRACTING OFFICER".

#### 1.13.5 Test Reports and Monthly Summary Report of Tests

Furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the (SRE/CO). Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month. Provide a copy of the signed test reports and certifications to the OMSI preparer for inclusion into the OMSI documentation.

#### 1.14 QC CERTIFICATIONS

##### 1.14.1 CQC Report Certification

Contain the following statement within the CQC Report: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report".

#### 1.14.2 Invoice Certification

Furnish a certificate to the (SRE/CO) with each payment request, signed by the QC Manager, attesting that as-built drawings are current, coordinated and attesting that the work for which payment is requested, including stored material, is in compliance with Contract requirements.

#### 1.14.3 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the (SRE/CO) attesting that "the work has been completed, inspected, tested and is in compliance with the Contract". Provide a copy of this final QC Certification for completion to the OMSI preparer for inclusion into the OMSI documentation.

### 1.15 COMPLETION INSPECTIONS

#### 1.15.1 Punch-Out Inspection

Near the completion of all work or any increment thereof, established by a completion time stated in the Contract Clause entitled "Commencement, Prosecution, and Completion of Work", or stated elsewhere in the specifications, the QC Manager and the CA must conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings, specifications and Contract. Include in the punch list any remaining items on the "Rework Items List", which were not corrected prior to the Punch-Out Inspection. Include within the punch list the estimated date by which the deficiencies will be corrected. Provide a copy of the punch list to the (SRE/CO). The QC Manager, or staff, must make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government "Pre-Final Inspection".

#### 1.15.2 Pre-Final Inspection

The Government and QCM will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" will be documented by the QCM as a result of this inspection. The QC Manager will ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the Client can be scheduled. Any items noted on the "Pre-Final" inspection must be corrected in a timely manner and be accomplished before the contract completion date for the work, or any particular increment thereof, if the project is divided into increments by separate completion dates.

#### 1.15.3 Final Acceptance Inspection

Notify the (SRE/CO) 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 (SRE/CO), other VA/NCA 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 (SRE/CO) to bill the Contractor for the Government's additional inspection cost in accordance with the Contract

QUALITY CONTROL

01 45 00-14

Clause entitled "Inspection of Construction".

#### 1.16 DOCUMENTATION

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

##### 1.16.1 Construction Documentation

Reports are required for each day that work is performed and must be attached to the Contractor Quality Control Report prepared for the same day. Maintain current and complete records of on-site and off-site QC program operations and activities. The forms identified under the paragraph "INFORMATION FOR THE CONTRACTING OFFICER" will be used. Reports are required for each day work is performed. Account for each calendar day throughout the life of the Contract. Every space on the forms must be filled in. Use N/A if nothing can be reported in one of the spaces. The Project Superintendent and the QC Manager must prepare and sign the Contractor Production and CQC Reports, respectively. The reporting of work must be identified by terminology consistent with the construction schedule. In the "remarks" sections of the reports, enter pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site, quality control problem areas, deviations from the QC Plan, construction deficiencies encountered, meetings held. For each entry in the report(s), identify the Schedule Activity No. that is associated with the entered remark.

##### 1.16.2 Quality Control Validation

Establish and maintain the following in a series of three ring binders. Binders shall be divided and tabbed as shown below. These binders must be readily available to the (SRE/CO) 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.

##### 1.16.3 Testing Plan and Log

As tests are performed, the CA and the QC Manager will record on the "Testing Plan and Log" the date the test was performed and the date the test results were forwarded to the (SRE/CO). Attach a copy of the updated "Testing Plan and Log" to the last daily CQC Report of each month, per the paragraph "INFORMATION FOR THE CONTRACTING OFFICER". Provide a copy of the final "Testing Plan and Log" to the OMSI preparer for inclusion into the OMSI documentation.

#### 1.16.4 Rework Items List

The QC Manager must maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item will be corrected by, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the "Rework Items List" to the last daily CQC Report of each month. The Contractor is responsible for including those items identified by the (SRE/CO).

#### 1.16.5 As-Built Drawings

The QC Manager is required to ensure the as-built drawings 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 (SRE/CO).

#### 1.17 NOTIFICATION ON NON-COMPLIANCE

The (SRE/CO) will notify the Contractor of any detected non-compliance with the Contract. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the (SRE/CO) 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 --

QUALITY CONTROL

01 45 00-17

**SECTION 01 45 29**  
**TESTING LABORATORY SERVICES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained and paid for by Contractor. Refer to Section 01 00 00, GENERAL REQUIREMENTS, for additional information.

**1.2 RELATED DOCUMENTS**

- A. Section 01 00 00, GENERAL REQUIREMENTS.

**1.3 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American Association of State Highway and Transportation Officials (AASHTO):
1. T27-11 - Sieve Analysis of Fine and Coarse Aggregates
  2. T96-02(R2006) - Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
  3. T99-10 - The Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop
  4. T104-99(R2007) - Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
  5. T180-10 - Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
  6. T191-02(R2006) - Density of Soil In-Place by the Sand-Cone Method
- C. American Society for Testing and Materials (ASTM):
1. A325-10 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
  2. A370-12a - Definitions for Mechanical Testing of Steel Products
  3. A490-12 - Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

4. C31/C31M-12 - Making and Curing Concrete Test Specimens in the Field
5. C33/C33M-13 - Concrete Aggregates
6. C39/C39M-12 - Compressive Strength of Cylindrical Concrete Specimens
7. C109/C109M-12 - Compressive Strength of Hydraulic Cement Mortars
8. C138/C138M-12a - Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
9. C140-13 - Sampling and Testing Concrete Masonry Units and Related Units
10. C143/C143M-12 - Slump of Hydraulic Cement Concrete
11. C172/C172M-10 - Sampling Freshly Mixed Concrete
12. C173/C173M-12 - Air Content of freshly Mixed Concrete by the Volumetric Method
13. C330/C330M-09 - Lightweight Aggregates for Structural Concrete
14. C567/C567M-11 - Density Structural Lightweight Concrete
15. C780-12a - Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
16. C1019-11 - Sampling and Testing Grout
17. C1064/C1064M-12 - Freshly Mixed Hydraulic Cement Concrete
18. C1077-13 - Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
19. C1314-12 - Compressive Strength of Masonry Prisms
20. C1364-10b - Architectural Cast Stone
21. D698-12 - Laboratory Compaction Characteristics of Soil Using Standard Effort
22. D1143/D1143M-07 - Deep Foundations Under Static Axial Compressive Load
23. D1188-07 - Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
24. D1556-07 - Density and Unit Weight of Soil in Place by the Sand-Cone Method
25. D1557-12 - Laboratory Compaction Characteristics of Soil Using Modified Effort
26. D2167-08 - Density and Unit Weight of Soil in Place by the Rubber Balloon Method

- 27. D2974-07 - Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
- 28. D3666-11 - Minimum Requirements for Agencies Testing and Inspection Bituminous Paving Materials
- 29. D3740-12a - Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock
- 30. E94-04(2010) - Radiographic Examination
- 31. E164-08 - Contact Ultrasonic Testing of Weldments
- 32. E329-11c - Agencies Engaged in Construction Inspection, Testing, or Special Inspection
- 33. E543-13 - Agencies Performing Nondestructive Testing
- 34. E709-08 - Guide for Magnetic Particle Testing
- 35. E1155-96(2008) - Determining FF Floor Flatness and FL Floor Levelness Numbers

D. American Welding Society (AWS):

- 1. D1.1-07 - Structural Welding Code-Steel

#### **1.4 REQUIREMENTS**

- A. Accreditation Requirements: Testing Laboratory retained and paid for by Contractor must be accredited by one or more of the National Voluntary Laboratory Accreditation Program (NVLAP) programs acceptable in the geographic region for the project. Furnish to the RE/COR a copy of the Certificate of Accreditation and Scope of Accreditation. For testing laboratories that have not yet obtained accreditation by a NVLAP program, submit an acknowledgement letter from one of the laboratory accreditation authorities indicating that the application for accreditation has been received and the accreditation process has started, and submit to the RE/COR for approval, certified statements, signed by an official of the testing laboratory attesting that the proposed laboratory, meets or conforms to the ASTM standards listed below as appropriate to the testing field.
- 1. Laboratories engaged in testing of construction materials must meet the requirements of ASTM E329.
  - 2. Laboratories engaged in testing of concrete and concrete aggregates must meet the requirements of ASTM C1077.

3. Laboratories engaged in testing of bituminous paving materials must meet the requirements of ASTM D3666.
  4. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, must meet the requirements of ASTM D3740.
  5. Laboratories engaged in inspection and testing of steel, stainless steel, and related alloys will be evaluated according to ASTM A880.
  6. Laboratories engaged in non-destructive testing (NDT) must meet the requirements of ASTM E543.
  7. Laboratories engaged in Hazardous Materials Testing must meet the requirements of OSHA and EPA.
- B. Inspection and Testing: Testing laboratory to inspect materials and workmanship and perform tests described herein and additional tests requested by RE/COR. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory must direct attention of RE/COR to such failure.
- C. Written Reports: Testing laboratory to submit test reports to RE/COR, Contractor, and Local Building Authority within 24 hours after each test is completed unless other arrangements are agreed to in writing by the RE/COR. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to RE/COR immediately of any irregularity.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 EARTHWORK**

- A. General: The Testing Laboratory is to provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed is as identified herein including, but not be limited to, the following:



1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the RE/COR regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to RE/COR extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
2. Provide part time observation of fill placement and compaction and field density testing in building areas and provide full time observation of fill placement and compaction and field density testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.
3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.

B. Testing Compaction:

1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with AASHTO T99/T180 Method A, ASTM D1557 Method A, ASTM D698 and/or ASTM D1557.
2. Make field density tests in accordance with the primary testing method following ASTM D2922, AASHTO T238 wherever possible. Field density tests utilizing ASTM D1556, AASHTO T191, or ASTM D2167 to be utilized on a case by case basis only if there are problems with the validity of the results from the primary method due to specific site field conditions. Should the testing laboratory propose these alternative methods, they must provide satisfactory explanation to the RE/COR before the tests are conducted.
  - a. Building Slab Subgrade: At least one test of subgrade for every 185 m<sup>2</sup> (2000 square feet) of building slab, but in no case fewer than three tests. In each compacted fill layer, perform one test for every 185 m<sup>2</sup> (2000 square feet) of overlaying building slab, but in no case fewer than three tests.
  - b. Foundation Wall Backfill: One test per 30 m (100 feet) of each layer of compacted fill but in no case fewer than two tests.

- c. Pavement Subgrade: One test for each 335 m<sup>2</sup> (400 square yards), but in no case fewer than two tests.
  - d. Curb, Gutter, and Sidewalk: One test for each 90 m (300 feet), but in no case fewer than two tests.
  - e. Trenches: One test at maximum 30 m (100 foot) intervals per 1200 mm (4 foot) of vertical lift and at changes in required density, but in no case fewer than two tests.
  - f. Footing Subgrade: At least one test for each layer of soil on which footings will be placed. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested subgrade when acceptable to RE/COR. In each compacted fill layer below wall footings, perform one field density test for every 30 m (100 feet) of wall. Verify subgrade is level, all loose or disturbed soils have been removed, and correlate actual soil conditions observed with those indicated by test borings.
- C. Testing for Footing Bearing Capacity: Evaluate if suitable bearing capacity material is encountered in footing subgrade.
- D. Testing Materials: Test suitability of on-site and off-site borrow as directed by RE/COR.

### **3.2 LANDSCAPING**

- A. Test topsoil for organic materials, pH, phosphate, potash content, and gradation of particles.
- 1. Test for organic material by using ASTM D2974.
  - 2. Determine percent of silt, sand, clay, and foreign materials such as rock, roots, and vegetation.
- B. Submit laboratory test report of topsoil to RE/COR.

### **3.3 ASPHALT CONCRETE PAVING**

- A. Aggregate Base Course:
- 1. Determine maximum density and optimum moisture content for aggregate base material in accordance with AASHTO T180, Method D.
  - 2. Make a minimum of three field density tests on each day's final compaction on each aggregate course in accordance with// AASHTO T191.

3. Sample and test aggregate as necessary to insure compliance with specification requirements for gradation, wear, and soundness as specified in the applicable state highway standards and specifications.

B. Asphalt Concrete:

1. Aggregate: Sample and test aggregates in stock pile and hot-bins as necessary to insure compliance with specification requirements for gradation (AASHTO T27), wear (AASHTO T96), and soundness (AASHTO T104).
2. Temperature: Check temperature of each load of asphalt concrete at mixing plant and at site of paving operation.
3. Density: Make a minimum of two field density tests in accordance with ASTM D1188 of asphalt base and surface course for each day's paving operation.

**3.4 SITE WORK CONCRETE**

- A. Test site work concrete including materials for concrete as required in Article CONCRETE of this section.

**3.5 CONCRETE**

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of RE/COR with concurrence of Contracting Officer and perform periodic inspections thereafter as determined by RE/COR.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to RE/COR.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips

(duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

B. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads are to be removed from the site at the Contractor's expense. Any rejected concrete that is placed will be subject to removal.
3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for any one day's pour for each concrete type. After good concrete quality control has been established and maintained as determined by RE/COR make three cylinders for each 80 m3 (100 cubic yards) or less of each concrete type, and at least three cylinders from any one day's pour for each concrete type. Label each cylinder with an identification number. RE/COR may require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day's pumping operations to determine change in slump.
5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 m3 (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m3 (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.

6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
9. Verify that specified mixing has been accomplished.
10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
  - a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
  - b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.
12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
15. Observe preparations for placement of concrete:
  - a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.

- b. Inspect preparation of construction, expansion, and isolation joints.
- 16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
- 17. Observe concrete mixing:
  - a. Monitor and record amount of water added at project site.
  - b. Observe minimum and maximum mixing times.
- 18. Measure concrete flatwork for levelness and flatness as follows:
  - a. Perform Floor Tolerance Measurements FF and FL in accordance with ASTM E1155. Calculate the actual overall F- numbers using the inferior/superior area method.
  - b. Perform all floor tolerance measurements within 48 hours after slab installation and prior to removal of shoring and formwork.
  - c. Provide the Contractor and the RE/COR with the results of all profile tests, including a running tabulation of the overall FF and FL values for all slabs installed to date, within 72 hours after each slab installation.
- 19. Other inspections:
  - a. Grouting under base plates.
  - b. Grouting anchor bolts and reinforcing steel in hardened concrete.
- C. Laboratory Tests of Field Samples:
  - 1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by RE/COR. Compile laboratory test reports as follows: Compressive strength test to be the result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it must be discarded and strength of spare cylinder to be used.
  - 2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
  - 3. Furnish certified compression test reports (duplicate) to RE/COR. In test report, indicate the following information:
    - a. Cylinder identification number and date cast.

- b. Specific location at which test samples were taken.
- c. Type of concrete, slump, and percent air.
- d. Compressive strength of concrete in MPa (psi).
- e. Weight of lightweight structural concrete in kg/m<sup>3</sup> (pounds per cubic feet).
- f. Weather conditions during placing.
- g. Temperature of concrete in each test cylinder when test cylinder was molded.
- h. Maximum and minimum ambient temperature during placing.
- i. Ambient temperature when concrete sample in test cylinder was taken.
- j. Date delivered to laboratory and date tested.

### **3.6 REINFORCEMENT**

- A. Review mill test reports furnished by Contractor.
- B. Make one tensile and one bend test in accordance with ASTM A370 from each pair of samples obtained.
- C. Written report must include, in addition to test results, heat number, manufacturer, type and grade of steel, and bar size.
- D. Perform tension tests of mechanical and welded splices in accordance with ASTM A370.

### **3.7 PRESTRESSED CONCRETE**

- A. Inspection at Plant: Forms, placement and concrete cover of reinforcing steel and tendons, placement and finishing of concrete, and tensioning of tendons.
- B. Concrete Testing: Test concrete including materials for concrete required in Article, CONCRETE of this section, except make two test cylinders for each day's production of each strength of concrete produced.
- C. Test tendons for conformance with ASTM A416 and furnish report to RE/COR.
- D. Inspect members to insure that specification requirements for curing and finishes have been met.

### **3.8 ARCHITECTURAL CAST STONE**

- A. Perform testing according to ASTM C1364 or verify compliance by reviewing previous test results of same product.

- B. Inspect the plant to verify that specification requirements for curing and finishes have been met.

### **3.9 MASONRY**

#### **A. Mortar Tests:**

- 1. Laboratory compressive strength test:
  - a. Comply with ASTM C780.
  - b. Obtain samples during or immediately after discharge from batch mixer.
  - c. Furnish molds with 50 mm (2 inch), 3 compartment gang cube.
  - d. Test one sample at 7 days and 2 samples at 28 days.
- 2. Two tests during first week of operation; one test per week after initial test until masonry completion.

#### **B. Grout Tests:**

- 1. Laboratory compressive strength test:
  - a. Comply with ASTM C1019.
  - b. Test one sample at 7 days and 2 samples at 28 days.
  - c. Perform test for each 230 m2 (2500 square feet) of masonry.

#### **C. Masonry Unit Tests:**

- 1. Laboratory Compressive Strength Test:
  - a. Comply with ASTM C140.
  - b. Test 3 samples for each 460 m2 (5000 square feet) of wall area.

- D. Prism Tests: For each type of wall construction indicated, test masonry prisms per ASTM C1314 for each 460 m2 (5000 square feet) of wall area. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

### **3.10 STRUCTURAL STEEL**

- A. General: Provide shop and field inspection and testing services to certify structural steel work is done in accordance with contract documents. Conform to AWS D1.1 Structural Welding Code for welding.

#### **B. Prefabrication Inspection:**

- 1. Review design and shop detail drawings for size, length, type and location of all welds to be made.
- 2. Approve welding procedure qualifications by pre-qualification or by witnessing qualifications tests.



3. Approve welder qualifications by certification or retesting.
4. Approve procedure for control of distortion and shrinkage stresses.
5. Approve procedures for welding in accordance with applicable sections of AWS D1.1.

C. Fabrication and Erection:

1. Weld Inspection:

- a. Inspect welding equipment for capacity, maintenance and working condition.
- b. Verify specified electrodes and handling and storage of electrodes in accordance with AWS D1.1.
- c. Inspect preparation and assembly of materials to be welded for conformance with AWS D1.1.
- d. Inspect preheating and interpass temperatures for conformance with AWS D1.1.
- e. Measure 25 percent of fillet welds.
- f. Welding Magnetic Particle Testing: Test in accordance with ASTM E709 for a minimum of:
  - 1) 20 percent of all shear plate fillet welds at random, final pass only.
  - 2) 20 percent of all continuity plate and bracing gusset plate fillet welds, at random, final pass only.
  - 3) 100 percent of tension member fillet welds (i.e., hanger connection plates and other similar connections) for root and final passes.
  - 4) 20 percent of length of built-up column member partial penetration and fillet welds at random for root and final passes.
  - 5) 100 percent of length of built-up girder member partial penetration and fillet welds for root and final passes.
- g. Welding Ultrasonic Testing: Test in accordance with ASTM E164 and AWS D1.1 for 100 percent of all full penetration welds, braced and moment frame column splices, and a minimum of 20 percent of all other partial penetration column splices, at random.

- h. Welding Radiographic Testing: Test in accordance with ASTM E94, and AWS D1.1 for 5 percent of all full penetration welds at random.
  - i. Verify that rejected welds corrections are made in accordance with AWS D1.1.
  - j. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.
2. Bolt Inspection:
- a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.
  - b. Slip-Critical Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in each connection in accordance with AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
  - c. Fully Pre-tensioned Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in 25 percent of connections in accordance with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
  - d. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.
  - e. Snug Tight Connections: Inspect 10 percent of connections verifying that plies of connected elements have been brought into snug contact.
  - f. Inspect field erected assemblies; verify locations of structural steel for plumbness, level, and alignment.
- D. Submit inspection reports, record of welders and their certification, and identification, and instances of noncompliance to RE/COR.

### **3.11 STEEL DECKING**

- A. Provide field inspection of welds of metal deck to the supporting steel, and testing services to insure steel decking has been

installed in accordance with contract documents and manufacturer's requirements.

- B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS D1.1. Refer to the "Plug Weld Qualification Procedure" in Part 3 "Field Quality Control."
- C. Submit inspection reports, certification, and instances of noncompliance to RE/COR.

### **3.12 SHEAR CONNECTOR STUDS**

- A. Provide field inspection and testing services required by AWS D.1 to insure shear connector studs have been installed in accordance with contract documents.
- B. Tests: Test 20 percent of headed studs for fastening strength in accordance with AWS D1.1.
- C. Submit inspection reports, certification, and instances of noncompliance to RE/COR.

- - - END - - -

**SECTION 01 57 19**  
**TEMPORARY ENVIRONMENTAL CONTROLS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, and solid waste, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.
- B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
  - 1. Adversely effect human health or welfare.
  - 2. Unfavorably alter ecological balances of importance to human life.
  - 3. Affect other species of importance to humankind.
  - 4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

**1.2 DEFINITIONS OF POLLUTANTS**

- A. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
- B. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
- C. Sediment: Soil and other debris that has been eroded and transported by runoff water.
- D. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from project construction activities.
- E. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the

United States" and require a permit to discharge water from the governing agency.

- F. Rubbish: Combustible and noncombustible wastes such as, but not limited to, paper, plastic, metal and plastic containers and cans, boxes, metal and lumber scrap.
- G. Sanitary Wastes: Domestic Sanitary Sewage.

### 1.3 QUALITY CONTROL

- A. Establish and maintain quality control for the environmental protection of all items set forth herein.
- B. Record on daily reports any problems in complying with laws, regulations, ordinances and note any corrective action taken.

### 1.4 REFERENCES

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. U.S. National Archives and Records Administration (NARA):
  - 1. 33 CFR 328 Definitions, Waters of the United States.
- C. Federal Environmental Regulatory Requirements: Comply with applicable regulations. The following is for Contractor's information only:
  - 1. Storm water permits; refer to The Office of Wastewater Management, NPDES Storm Water Program:  
<http://www.epa.gov/npdes/stormwater>
  - 2. Dredge and fill (Section 404) permits; refer to U.S. EPA Office of Wetlands, Oceans, and Watersheds (OWOW):  
<http://www.epa.gov/owow/>
  - 3. RCRA hazardous and non-hazardous solid waste requirements; refer to EPA's Office of Solid Waste and Emergency Response:  
<http://www.epa.gov/epaoswer/osw/laws-reg.htm>
  - 4. Oil spill requirements for construction activities; refer to EPA Oil Program web site: <http://www.epa.gov/oilspill/>

5. Hazardous substances (Superfund Liability) requirements for construction activities; refer to EPA's Superfund website:  
<http://www.epa.gov/superfund/index.htm>
  6. Polychlorinated Biphenyl (PCB) waste requirements; refer to EPA's Polychlorinated Biphenyl (PCB) Homepage:  
<http://www.epa.gov/pcb/>
  7. Air quality requirements for construction activities; refer to EPA'S Air Program Mobile Sources Page:  
<http://www.epa.gov/ebtpages/airmobilesources.html>
  8. Asbestos requirements for construction activities; refer to EPA's Asbestos Management and Regulatory Requirements Website:  
<http://www.epa.gov/fedsite/cd/asbestos.html>
  9. National Environmental Policy Act (NEPA) requirements for construction activities
  10. 10. Endangered Species Act; refer to The US Fish and Wildlife Service Endangered Species Program: <http://endangered.fws.gov/>
  11. 11. National Historic Preservation Act
- D. State and Local Environmental Regulatory Requirements: Comply with applicable regulations. The following is for Contractor's information only:
1. State Office/Department of Environmental Quality.
  2. Local Office/Department of Environmental Quality.
  3. The Construction Industry Compliance Assistance Center:  
<http://www.cicacenter.org/index.cfm>
  4. The National Environmental Compliance Assistance Clearinghouse:  
<http://cfpub.epa.gov/clearinghouse/>

#### **1.5 SUBMITTALS**

- A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, the Contractor shall furnish the following:
1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, meet with the Resident Engineer/Contracting Officer's Representative (RE/COR) to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, prepare and submit to

the RE/COR // for approval //, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:

- a. Name(s) and qualifications of person(s) within the Contractor's organization who is (are) responsible for:
  - 1) Ensuring adherence to the Environmental Protection Plan.
  - 2) Manifesting hazardous waste to be removed from the site.
  - 3) Training the Contractor's environmental protection personnel.
- b. Description of the Contractor's environmental protection personnel training program.
- c. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
- d. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
- e. Procedures to provide environmental protection that complies with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
- f. Permits, licenses, and the location of the solid waste disposal area.
- g. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, // stream crossings, //material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the District Office of the U.S. Soil Conservation Service and/or mandated state agency, and the Department of Veterans Affairs.

- h. Environmental Monitoring Plans for the job site including land, water, air, and noise.
  - i. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of construction limits or protected areas. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
- B. Within 20 days after the date of its submittal, the RE/COR shall approve the Contractor's Comprehensive Environmental Protection Plan, or respond with an explanation for its rejection and resubmittal.
- C. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

#### **1.6 PROTECTION OF ENVIRONMENTAL RESOURCES**

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract and after the project is complete, based upon leaving the site that has yet to mature of hydroseeding. Confine construction activities to areas defined by construction limits, the specifications and drawings.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, land forms, wetlands or wetland buffers without prior approval from the RE/COR. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or dictated by special emergency use.
- 1. Work Area Limits: Prior to any construction, mark/fence/protect the areas that require work to be performed under this contract. Prior to construction, mark/fence/protect monuments, works of art, and any other markers to remain. Convey to all personnel the purpose of marking and protecting all marked and protected objects.
  - 2. Protection of Specific Regulated Elements: Wetlands and wetland buffers and other landscape features shown on the drawings to be



preserved by marking, fencing, or using any other approved protective techniques.

- a. Protect trees and shrubs to remain on site to protect from damage per contract details.
  - b. All damage to existing trees and shrubs shall be immediately repaired by trimming, cleaning, and painting with antiseptic tree paint. See Section 02 41 19.
  - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas only as needed to use to work the area to be developed. Form earthwork to final grade as shown as quickly as possible to minimize potential erosion damage. Immediately protect side slopes and back slopes upon completion of rough grading or clearing with appropriate material as defined in the Sediment and Erosion Control Plan.
  4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, check dams and berms to retard and divert runoff from the construction site to protected drainage areas as intended under paragraph 208 of the Clean Water Act.
    - a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a local 10 year (design year) storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, that drain from the surface of the basin.
    - b. Reuse or conserve the collected topsoil sediment as directed by the RE/COR. Topsoil use and requirements are specified in Section 31 20 11, EARTH MOVING.
    - c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
  5. Erosion and Sedimentation Control Devices: Construct or install all temporary and permanent erosion and sedimentation control

features shown on the Environmental Protection Plan to avoid violating water quality in accordance with federal and state regulations. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, straw wattles, fiber rolls, until permanent drainage and erosion control facilities are completed and operative.

6. Manage and control borrow and spoil areas on Government property to minimize erosion and to prevent soil and/or sediment from entering nearby water courses or lakes.
  7. Protect adjacent areas from despoilment by temporary excavations and embankments.
  8. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
  9. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
  10. Handle discarded materials other than those included in the solid waste category as directed by the RE/COR.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in sediment basins prior to entering retention/detention ponds, allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
  2. Monitor water areas, wetlands and wetland buffers affected by construction.

- D. Protection of Fish and Wildlife Resources: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife. Prior to beginning construction operations, list protected species that require specific attention along with measures for their protection.
- E. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of California AQMD and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials / at all times, including weekends, holidays, and hours when work is not in progress.
  2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, or other methods are permitted to control particulates in the work area as approved in the Environmental Protection Plan.
  3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
  4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- F. Noise Control: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Resident Engineer/COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 6:00 a.m. and 6:00 p.m. unless

otherwise permitted by local ordinance or the RE/COR. Repetitive impact noise on the property shall not exceed the following

Decibel A-scale (dBA) limitations:

Time Duration of Impact Noise	Sound Level in dBA
More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:

- a. Maintain maximum permissible construction equipment noise levels as measured with an A-scale decibel measuring device at 15 m (50 feet) (dBA):

CATEGORY OF EQUIPMENT			
EARTHMOVING		MATERIALS HANDLING	
EQUIPMENT STYLE	SOUND LEVEL dBA	EQUIPMENT STYLE	SOUND LEVEL dBA
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	ROCK DRILLS	80
PAVERS, STATIONARY	80	PNEUMATIC TOOLS	80
PUMPS	75	BLASTING	// -- //
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	75

- b. Provide soundproof housings or enclosures for noise-producing machinery.
  - c. Use efficient silencers on equipment air intakes.
  - d. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
  - e. Line hoppers and storage bins with sound deadening material.
  - f. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 75 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighted sound level of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the Resident Engineer/COR noting any problems and the alternatives for mitigating actions.
- G. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- H. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition as approved by the RE/COR. The site shall be left meeting the requirements of the local and state environmental requirements associated with the (SWPPP) Storm Water Pollution Protection Plan as submitted. Cleaning shall include off-cemetery disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition

and new work operations, clearing, logging and general construction  
in accordance with state and local regulations and the contract.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

- - - END - - -

**SECTION 01 64 00  
OWNER-FURNISHED PRODUCTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Owner's responsibilities.
  - 2. Contractor's responsibilities.
  - 3. Owner furnished, Contractor installed (OFICI) products.

**1.2 OWNER'S RESPONSIBILITIES**

- A. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
- B. Arrange and pay for product delivery to Project site or to Contractor's warehouse facility.
- C. On delivery, inspect products jointly with Contractor.
- D. Submit claims for transportation damage and replace damaged, defective, or deficient items.
- E. Arrange for manufacturers' warranties, inspections and field service.

**1.3 CONTRACTOR'S RESPONSIBILITIES**

- A. Determine quantities required for Owner furnished Products.
- B. Review Owner provided shop drawings, product data, and samples.
- C. Receive and unload products; inspect for completeness and damage, jointly with Owner.
- D. When delivered to Contractor's warehouse, provide loading, transportation to Project site, and unloading in preparation for installation.
- E. Handle, store, install and finish products.
- F. Repair or replace items damaged after receipt.
- G. Deliver to Owner unused materials and remnants for Owner to store as maintenance materials. Obtain signed receipt from Owner.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Coordinate delivery schedule with Owner to expedite Project.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 OFCI PRODUCTS SCHEDULE**

- A. Gravesite Locator Kiosk.
- B. Other Products identified on Drawings or by Owner as OFCI.

- - - END - - -



**SECTION 01 74 19**  
**CONSTRUCTION WASTE MANAGEMENT**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.
- C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
  - 1. Waste Management Plan development and implementation.
  - 2. Techniques to minimize waste generation.
  - 3. Sorting and separating of waste materials.
  - 4. Salvage of existing materials and items for reuse or resale.
  - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
  - 1. Soil.
  - 2. Inerts (eg, concrete, masonry and asphalt).
  - 3. Clean dimensional wood and palette wood.
  - 4. Green waste (biodegradable landscaping materials).
  - 5. Engineered wood products (plywood, particle board and I-joists, etc).
  - 6. Metal products (eg, steel, wire, beverage containers, etc).
  - 7. Cardboard, paper and packaging.
  - 8. Bitumen roofing materials.
  - 9. Plastics (eg, ABS, PVC).
  - 10. Carpet and/or pad.
  - 11. Gypsum board.
  - 12. Insulation.
  - 13. Paint.

**1.2 RELATED WORK**

- A. Section 02 41 00, DEMOLITION.
- B. Section 01 00 00, GENERAL REQUIREMENTS.
- C. Lead Paint: Section 02 83 33.13, LEAD BASED PAINT REMOVAL AND DISPOSAL.

**1.3 QUALITY ASSURANCE**

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
  - 1. Excess or unusable construction materials.
  - 2. Packaging used for construction products.
  - 3. Poor planning and/or layout.
  - 4. Construction error.
  - 5. Over ordering.
  - 6. Weather damage.
  - 7. Contamination.
  - 8. Mishandling.
  - 9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to reuse and recycle new materials to a minimum of 50 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org/tools/cwm.php> provides a Construction Waste

Management Database that contains information on companies that haul. Collect, and process recyclable debris from construction projects.

- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.
- G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
- H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

#### **1.4 TERMINOLOGY**

- A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.
- B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.
- C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.
- D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.
- E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).
- F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.
- G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.
- H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.

- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.
- K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.
- L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
  - 1. On-site Recycling - Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
  - 2. Off-site Recycling - Materials hauled to a location and used in an altered form in the manufacture of new products.
- M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.
- N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.
- O. Return: To give back reusable items or unused products to vendors for credit.
- P. Salvage: To remove waste materials from the site for resale or re-use by a third party.
- Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.
- R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.
- S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto

other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

#### 1.5 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:
- B. Prepare and submit to the Resident Engineer a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
  - 1. Procedures to be used for debris management.
  - 2. Techniques to be used to minimize waste generation.
  - 3. Analysis of the estimated job site waste to be generated:
    - a. List of each material and quantity to be salvaged, reused, recycled.
    - b. List of each material and quantity proposed to be taken to a landfill.
  - 4. Detailed description of the Means/Methods to be used for material handling.
    - a. On site: Material separation, storage, protection where applicable.
    - b. Off site: Transportation means and destination. Include list of materials.
      - 1) Description of materials to be site-separated and self-hauled to designated facilities.
      - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
    - c. The names and locations of mixed debris reuse and recycling facilities or sites.
    - d. The names and locations of trash disposal landfill facilities or sites.
    - e. Documentation that the facilities or sites are approved to receive the materials.
- C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.

- D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

#### **1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.
- B. U.S. Green Building Council (USGBC):
- C. LEED Green Building Rating System for New Construction

#### **1.7 RECORDS**

- A. Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and LEED Template.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. List of each material and quantity to be salvaged, recycled, reused.
- B. List of each material and quantity proposed to be taken to a landfill.
- C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

### **PART 3 - EXECUTION**

#### **3.1 COLLECTION**

- A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.
- B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.
- C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

**3.2 DISPOSAL**

- A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.
- B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

**3.3 REPORT**

- A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.
- B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
- C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

- - - END - - -

**SECTION 02 21 00  
SITE SURVEYS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the gathering of research documents, performance of a topographic survey and preparation of a topographic survey map.

**1.2 DEFINITIONS**

- A. Professional Land Surveyor: One who possesses a valid state license as a "Professional Land Surveyor" from the state in which they practice.
- B. Professional Civil Engineer: One who possesses a valid state license as a "Professional Civil Engineer" from the state in which they practice. For this section, the term "surveyor" shall also include Professional Civil Engineers authorized to practice Land Surveying under the laws of the state in which they practice.

**1.3 SUSTAINABILITY REQUIREMENTS**

- A. Materials in this section may contribute towards contract compliance with sustainability requirements. See Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS, for project requirements.

**PART 2 - EXECUTION**

**2.1 PROCEDURES**

- A. The surveyor shall research available public records for all mapping, monumentation, plats, governmental surveys etc. that may pertain to the subject property. Research all applicable public utilities for substructure data such as sewers, storm drains, water lines, electrical conduits, gas mains, telephone, etc.
- B. The survey shall be performed on the ground in accordance with the current "Accuracy Standards for Land Title Surveys" as adopted, from time to time, by the American Congress on Surveying and Mapping, the National Society of Professional Surveyors, and the American Land Title Association.
- C. The surveyor, when applicable, shall consult with the project Architect to determine scale of plat or map and size of drawings.



- D. The surveyor shall furnish two sets of prints of the plat or map of survey and an electronic CADD file. If the plat or map of survey consists of more than one sheet, the sheets shall be numbered, the total number of sheets indicated and the match lines be shown on each sheet.
- E. On the plat or map, the survey boundary shall be drawn to a convenient scale, or the scale designated by the Architect, with the scale clearly indicated. A graphic scale, shown in feet or meters or both, shall be included. A north arrow shall be shown and when practicable, the plat or map of survey shall be oriented so that north is at the top of the drawing. Symbols or abbreviations used shall be identified on the face of the plat or map by use of a legend or other means. Supplementary or exaggerated diagrams shall be presented accurately on the plat or map where dimensional data is too small to be shown clearly at full scale. The plat or map shall be 760 mm by 1060 mm (30 by 42 inches).
- F. The survey shall contain the following applicable information:
1. The name, address, telephone number, and signature of the Professional Land Surveyor who made the survey, his or her official seal and registration number, the date the survey was completed and the dates of all revisions.
  2. The survey drawing(s) submitted shall bear the following certification adjacent to the Engineer's official seal:
    - a. "I hereby certify that all information indicated on this drawing was obtained or verified by actual measurements in the field and that every effort has been made to furnish complete and accurate information."
  3. Vicinity map showing the property surveyed in reference to nearby highways or major street intersections.
  4. Flood zone designation (with proper annotation based on Federal Flood Insurance Rate Maps or the state or local equivalent, by scaled map location and graphic plotting only).
  5. Land area as defined by the boundaries of the legal description of the surveyed premises.
  6. All data necessary to indicate the mathematical dimensions and relationships of the boundary represented by bearings and distances, and the length and radius of each curve, together with

elements necessary to mathematically define each curve. The point of beginning of the surveyor's description and the basis of bearings shall also be shown.

7. When record bearings or angles or distances differ from measured bearings, angles or distances, both record and measured bearings, angles, and distances shall be clearly indicated. If the record description fails to form a mathematically closed figure, the surveyor shall so indicate.
8. Measured and record distances from corners of parcels surveyed to the nearest right-of-way lines of streets in urban or suburban areas, together with recovered lot corners and evidence of lot corners, shall be noted. The distances to the nearest intersecting street shall be indicated and verified. Names and widths of streets and highways abutting the property surveyed and widths of rights of way shall be given. Observable evidence of access (or lack thereof) to such abutting streets or highways shall be indicated. Observable evidence of private roads shall be so indicated. Streets abutting the premises, which have been described in Record Documents, but not physically opened, shall be shown and so noted.
9. The identifying titles of all recorded plats, filed maps, right of way maps, or similar documents which the survey represents, wholly or in part, with their appropriate recording data. The survey shall indicate platted setback or building restriction lines which have been recorded in subdivision plats or which appear in a Record Document which has been delivered to the surveyor. Contiguity, gores, and overlaps along the exterior boundaries of the survey premises, where ascertainable from field evidence or Record Documents, or interior to those exterior boundaries, shall be clearly indicated or noted. Where only a part of a recorded lot or parcel is included in the survey, the balance of the lot or parcel shall be indicated.
10. All evidence of found monuments shall be shown and noted. All evidence of monuments found beyond the surveyed premises on which establishment of the corners of the survey premises are dependent, and their application related to the survey shall be indicated.

11. The character of any and all evidence of possession shall be stated and the location of such evidence carefully given in relation to both the measured boundary lines and those established by the record. An absence of notation on the survey shall be presumptive of no observable evidence of possession. The term "possession" does not imply "ownership".
12. The location of all buildings upon the plot or parcel shall be shown and their locations defined by measurements perpendicular to the boundaries. If there are no buildings, so state. Proper street numbers shall be shown where available.
13. All easements evidenced by a Record Document which have been delivered to the surveyor shall be shown, both those burdening and those benefiting the property surveyed, indicating recording information. If such an easement cannot be located, a note to this affect shall be included. Observable evidence of easements and/or servitudes of all kinds, such as those created by roads, rights-of-ways, water courses, drains, telephone, telegraph, or electric lines, water, sewer, oil or gas pipelines on or across the surveyed property and on adjoining properties if they appear to affect the surveyed property, shall be located and noted. Surface indications, if any, or of underground easements and/or servitudes shall also be shown.
14. The character and location of all walls, buildings, fences, and other visible improvements within five feet of each side of the boundary lines shall be noted. Without expressing a legal opinion, physical evidence of all encroaching structural appurtenances and projections, such as fire escapes, bay windows, windows and doors that open out, flue pipes, stoops, eaves, cornices, areaways, trip, etc., by or on adjoining property or on abutting streets, on any easement or over setback lines shown by Record Documents shall be indicated with the extent of such encroachment or projection.
15. Driveways and alleys on or crossing the property must be shown. Where there is evidence of use by other than the occupants of the property, the surveyor must so indicate on the plat or map. Where driveways or alleys on adjoining properties encroach, in whole or

- in part, on the property being surveyed, the surveyor must so indicate on the plat or map with appropriate measurements.
16. Location, alignment and dimensions of all roads, curbs, walks, parking and paved areas abutting the subject land. Indicate road centerlines with true bearings and lengths by 15 m (50 foot) stationing. Describe curves by designating the points of curvature and tangency by station. Include all curve data as well a location of radius and vertex points. Elevations on 15 m (50') centers on centerline of roads, edges of roads and top and bottom of curbs.
  17. As accurately as the evidence permits, the location of cemeteries and burial grounds disclosed in the process of researching title to the premises or observed in the process of performing the field work for the survey, shall be shown.
  18. Ponds, lakes, springs, or rivers bordering on or running through the premises being surveyed shall be shown. When a property surveyed contains a natural water boundary, the surveyor shall measure the location of the boundary according to appropriate surveying methods and note on the plat or map the date of the measurement and the caveat that the boundary is subject to change due to natural causes and that it may or may not represent the actual location of the limit of title. When the surveyor is aware of changes in such boundaries, the extent of those changes shall be identified.
  19. Contours at a minimum interval of 300 mm (1 foot). Modify between 2 and 10 feet if 1 foot not applicable to project. Base vertical control on the permanent (not assumed) National Geodetic Survey (NGS). Note location, description and datum. Install a permanent National Geodetic Survey (NGS) Bench Mark within the property for use by any future surveyors for projects on the property. Furnish and install two monuments on the property, or property lines, that are tied to the State Plane Coordinate system, and indicate the respective Northing and Easting coordinates for the points in feet, with 3 decimal place accuracy. Provide notes that these two points are the basis for the coordinate system indicated on the CADD survey drawings. Unless specifically noted otherwise, provide CADD drawing of the survey, in DWG format in a

version no older than two versions earlier than the most recent version of the software.

20. Identify and show if possible, setback, height, and floor space area restrictions of record or disclosed by applicable zoning or building codes (in addition to those recorded in subdivision maps). If none, so state.
21. Exterior dimensions of all buildings at ground level. Show square footage of exterior footprint of all buildings at ground level and gross floor area of all buildings.
22. Measured height of all buildings above grade at a defined location. If no defined location is provided, the point of measurement shall be shown.
23. Elevations at each entrance to buildings, service docks, building corners, steps, ramps and grade slabs.
24. Substantial, visible improvements (in addition to buildings) such as signs, parking areas, plazas, planter beds, benches, walls, swimming pools, etc.
25. Parking areas and, if striped, the striping and the type (eg. handicapped, motorcycle, regular, etc.) and number of parking spaces.
26. Indication of access to a public way such as curb cuts and driveways.
27. Location of utilities existing on or serving the surveyed property as determined by observed evidence together with plans and markings provided by utility companies, and other appropriate sources (with references as to the source of information. Locate and show all fire hydrants located within 150 m (500 feet) of the subject property.
28. Railroad tracks and sidings.
29. Manholes, catch basins, valve vaults or other surface indications of subterranean uses.
30. Wires and cables (including their function) crossing the survey premises, all poles on or within ten feet of the surveyed premises, and the dimensions of all cross-wires or overhangs affecting the surveyed premises.
31. Utility company installations on the surveyed premises.
32. Names of adjoining owners of platted lands.

33. Observable evidence of earth moving work, building construction or building additions within recent months.
34. Any changes in street right-of-way lines either completed or proposed, and available from the controlling jurisdiction.  
Observable evidence of recent street or sidewalk construction or repairs.
35. Observable evidence of site use as a solid waste dump, sump or sanitary landfill.
36. All trees with a minimum diameter of 150 mm (six inches) measured at 1200 mm (48") above the base of the tree. Perimeter outline only of thickly wooded areas with description of predominant vegetation.

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**SECTION 02 41 10**  
**DEMOLITION AND SITE CLEARING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies all site preparation work, demolition and removal of buildings, portions of buildings, utilities, other structures and debris from trash dumps shown.

**1.2 RELATED WORK**

- A. Demolition and removal of roads, walks, curbs, and on-grade slabs outside buildings to be demolished: Section 31 20 00, EARTH MOVING.
- B. Safety Requirements: GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
- C. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- E. Asbestos Removal: Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT.
- F. Lead Paint: Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
- G. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- H. Waste Management: Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT.

**1.3 PROTECTION**

- A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.

- C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.
- D. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.
- E. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.
- F. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
  - 1. No wall or part of wall shall be permitted to fall outwardly from structures.
  - 2. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
  - 3. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.



- G. Before beginning any demolition work, survey the site and examine the drawings and specifications to determine the extent of the work. Take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Cemetery; any damaged items shall be repaired or replaced as approved by the Resident Engineer/Contracting Officer's Representative (RE/COR). Coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have RE/COR's approval.
- H. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

#### 1.4 UTILITY SERVICES

- A. Demolish and remove outside utility service lines shown to be removed.
- B. Remove abandoned outside utility lines that would interfere with installation of new utility lines and new construction.

### PART 2 - PRODUCTS (Not Used)

### PART 3 - EXECUTION

#### 3.1 SITE CLEARING

- A. General: Remove trees, shrubs, grass, and other vegetation, pavements, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.
1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.

- B. Erosion Control: Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Install silt fence and inlet protection as shown and as per requirements of the SWPPP, prior to any soil disturbance activities. Provide temporary seeding as required by the SWPPP.
- C. Maintain site controls in accordance with Storm Water Pollution Prevention Plan and repair as directed by COTR to sustain compliance with SPDES permit. Maintain all records as required by the SWPPP. Perform inspections as required by the SWPPP.
- D. Topsoil - On-site: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 150 mm (6 inches). Satisfactory topsoil is reasonably free and/or screened of subsoil, clay lumps, stones, and other objects over 25 mm (1 inch) in diameter, and without weeds, roots, and other objectionable material.
  - 1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.
    - a. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
  - 2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles to prevent wind erosion in accordance with the Storm Water Pollution Prevention Plan. Refer to Division 2 Section 32 90 00, "Planting" for soil amendments required prior to spreading topsoil.
    - a. Stockpile shall be contained with erosion and sediment controls (silt fence) and stabilized if undisturbed in accordance with the Storm Water Pollution Prevention Plan.
  - 3. Dispose of unsuitable or excess topsoil as specified for disposal of waste material only after approval of the Architect.
- E. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, except for those indicated to be left standing.
  - 1. Completely remove stumps, roots, and other debris protruding through ground surface.

2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
  3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
    - a. Place fill material in horizontal layers not exceeding 150 mm (six inches) loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.
- F. Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.
- G. Abandonment or removal of certain underground pipe or conduits may be indicated on mechanical or electrical drawings and is included under work of related Division 15 and 16 Sections. Removing abandoned underground piping or conduits interfering with construction is included under this Section, except as indicated to be abandoned in-place.
- H. Continue maintenance of erosion controls in compliance with the Storm Water Pollution Prevention Plan until the work is completed and the threat of erosion is gone by either around surface stabilizer or lawn "grow-in" is at 85% complete. Temporary erosion control devices shall not be removed until the area is certified as being stabilized by the Qualified Inspector.
- 3.2 **DEMOLITION**
- A. Completely demolish and remove buildings and structures, including all appurtenances related or connected thereto, as noted below:
1. As required for installation of new utility service lines.
  2. To full depth within an area defined by hypothetical lines located 1500 mm (5 feet) outside building lines of new structures.

- B. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Cemetery Property to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the RE/COR. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.
- C. In removing buildings and structures of more than two stories, demolish work story by story starting at highest level and progressing down to third floor level. Demolition of first and second stories may proceed simultaneously.
- D. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 1500 mm (5 feet) below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications. Burning is not permitted on the property.
- E. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the RE/COR. When Utility lines are encountered that are not indicated on the drawings, the RE/COR shall be notified prior to further work in that area.

### 3.3 **CLEAN-UP**

- A. On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to RE/COR. Clean-up shall include off the Cemetery Property disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

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**SECTION 02 82 13.41  
ASBESTOS ABATEMENT FOR TOTAL DEMOLITION PROJECTS  
TABLE OF CONTENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY OF THE WORK**

**1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS**

Drawings, general provisions of the contract, including general and supplementary conditions, Asbestos Abatement, Demolition, Accident Prevention (FAR 52.236-13) and other Division 01, GENERAL REQUIREMENTS specifications, shall apply to the work of this section. Prevailing wage requirements pursuant to the Davis-Bacon Act shall apply to this work. The contract documents show the work to be done under the contract and related requirements and conditions impacting the project. Related requirements and conditions include applicable codes and regulations, notices and permits, existing site conditions and restrictions on use of the site, coordination with other work and the phasing of the work. In the event the Abatement Contractor discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the Contracting Officer for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply.

Any actions taken by the Abatement Contractor without obtaining guidance from the Contracting Officer shall become the sole risk and responsibility of the Abatement Contractor.

**1.1.2 EXTENT OF WORK**

- A. This work will be asbestos abatement prior to the total demolition of the facility as indicated by the scope of work. RACM discovered during total demolition is also within the scope of this specification. The extent of the abatement is for informational purposes only and is based on the best information available at the time of the specification preparation. The Abatement Contractor shall satisfy themselves as to the extent of the work. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents. THE EXTENT OF ABATEMENT REQUIRED IN BUILDING 505 IS UNDETERMINED AT THIS TIME. THE CONTRACTOR SHALL PERFORM ASBESTOS SURVEY AND DETERMINE REQUIRED EXTENT OF REMOVAL PER THESE SPECIFICATIONS. AN ALLOWANCE OF \$50,000.00 SHALL BE INCLUDED IN THE CONTRACTOR'S BID.
- B. Removal, clean-up and disposal of regulated asbestos containing materials (RACM) and asbestos contaminated elements shall be conducted in approved regulated areas in all areas prior to the beginning of demolition. Any RACM discovered during demolition activity shall be cause for stopping the work. The Demolition Contractor's personnel shall attend an on-site training session related to the types of asbestos at the site and shall not disturb the ACM if found during their work. No abatement work shall begin in any area unless the Abatement Contractor/Competent Person/VA Representative agreed that all asbestos

work requirements as stipulated in the specification have been met. Attachment #4 must be filled out for each abatement area.

#### 1.1.3 RELATED WORK

- A. Section 02 82 13.41, ASBESTOS ABATEMENT FOR TOTAL DEMOLITION PROJECTS.

#### 1.1.4 TASKS

The work tasks are summarized briefly as follows:

- A. Asbestos abatement of RACM as required by EPA NESHAP prior to demolition. An EPA/State certified Project Designer must provide a site-specific specification for the asbestos abatement.
- B. Asbestos abatement and clean-up of the asbestos containing debris as indicated in the scope of work. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, work-site preparation/isolation, accident prevention, emergency procedures arrangements, and standard operating procedures for asbestos abatement work.
- C. Demolition activities including demolition, clean-up and disposal of building materials, record keeping, security, monitoring, and inspections conducted in accordance with all applicable laws and this specification. A Demolition Plan, developed by a Professional Engineer, meeting the requirements of 29 CFR 1926.850(a) must be provided.

#### 1.1.5 ABATEMENT CONTRACTOR USE OF PREMISES

- A. The Contractor and Contractor's personnel shall cooperate fully with the VA representative/consultant to facilitate efficient use of buildings and areas within buildings. The Contractor shall perform the work in accordance with the VA specifications, drawings, phasing plan and in compliance with any/all applicable Federal, State and Local regulations and requirements.
- B. The Contractor shall use the existing facilities in the building strictly within the limits indicated in contract documents as well as the approved VA Design and Construction Procedure. VA Design and Construction Procedure drawings of partially occupied buildings will show the limits of regulated areas; the placement of decontamination facilities; the temporary location of bagged waste ACM; the path of transport to outside the building; and the temporary waste storage area for each building/regulated area. Any variation from the arrangements shown on drawings shall be secured in writing from the VA representative through the pre-abatement plan of action.

#### 1.2 STOP ABATEMENT ORDER

- A. If the Contracting Officer; their field representative; (the facility Safety Officer/Manager or their designee, or the VA Professional Industrial Hygienist/Certified Industrial Hygienist (VPIH/CIH) presents a verbal **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and maintain HEPA filtered negative pressure air flow in the containment and adequately wet any exposed ACM. If a verbal Stop Asbestos Removal Order is issued, the VA shall follow-up with a written order to the Contractor as soon as practicable. The

Contractor shall not resume any asbestos removal activity until authorized to do so in writing by the VA Contracting Officer. A stop asbestos removal order may be issued at any time the VA Contracting Officer determines abatement conditions/activities are not within VA specification, regulatory requirements or that an imminent hazard exists to human health or the environment. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the VPIH/CIH time. The occurrence of any of the following events shall be reported immediately by the Contractor's competent person to the VA Contracting Office or field representative using the most expeditious means (e.g., verbal or telephonic), followed up with written notification to the Contracting Officer as soon as it is practical. The Contractor shall immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

- A. Airborne PCM analysis results equal to or greater than 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area;
- B. Breach or break in regulated area containment barrier(s);
- C. Less than -0.02" WCG pressure in the regulated area;
- D. Serious injury/death at the site;
- E. Fire/safety emergency at the site;
- F. Respiratory protection system failure;
- G. Power failure or loss of wetting agent; or
- H. Any visible emissions observed outside the regulated area.

### 1.3 DEFINITIONS

#### 1.3.1 GENERAL

Definitions and explanations here are neither complete nor exclusive of all terms used in the contract documents, but are general for the work to the extent they are not stated more explicitly in another element of the contract documents. Drawings must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated therein.

#### 1.3.2 GLOSSARY:

**Abatement** - Procedures to control fiber release from asbestos-containing materials. Includes removal, encapsulation, enclosure, demolition and renovation activities related to asbestos containing materials (ACM).

**Aerosol** - Solid or liquid particulate suspended in air.

**Adequately wet** - Sufficiently mixed or penetrated with liquid to prevent the release of particulates. If visible emissions are observed coming from the ACM, then that material has not been adequately wetted.

**Aggressive method** - Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact ACM.

**Aggressive sampling** - EPA AHERA defined clearance sampling method using air moving equipment such as fans and leaf blowers to aggressively disturb and maintain in the air residual fibers after abatement.

**AHERA** - Asbestos Hazard Emergency Response Act. Asbestos regulations for schools issued in 1987.

**Aircell** - Pipe or duct insulation made of corrugated cardboard which contains asbestos.



**Air monitoring** - The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air. For personal samples and clearance air testing using Phase Contrast Microscopy (PCM) analysis. NIOSH Method 7402 can be used when it is necessary to confirm fibers counted by PCM as being asbestos. The AHERA TEM analysis may be used for background, area samples and clearance samples when required by this specification, or at the discretion of the VPIH/CIH as appropriate.

**Air sample filter** - The filter used to collect fibers which are then counted. The filter is made of mixed cellulose ester membrane for PCM (Phase Contrast Microscopy) and polycarbonate for TEM (Transmission Electron Microscopy)

**Amended water** - Water to which a surfactant (wetting agent) has been added to increase the penetrating ability of the liquid.

**Asbestos** - Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated or altered. Asbestos also includes PACM, as defined below.

**Asbestos Hazard Abatement Plan (AHAP)** - Asbestos work procedures required to be submitted by the contractor before work begins.

**Asbestos-containing material (ACM)** - Any material containing more than one percent of asbestos.

**Asbestos contaminated elements (ACE)** - Building elements such as ceilings, walls, lights, or ductwork that are contaminated with asbestos.

**Asbestos-contaminated soil (ACS)** - Soil found in the work area or in adjacent areas such as crawlspaces or pipe tunnels which is contaminated with asbestos-containing material debris and cannot be easily separated from the material.

**Asbestos-containing waste (ACW) material** - Asbestos-containing material or asbestos contaminated objects requiring disposal.

**Asbestos Project Monitor** - Some states require that any person conducting asbestos abatement clearance inspections and clearance air sampling be licensed as an asbestos project monitor.

**Asbestos waste decontamination facility** - A system consisting of drum/bag washing facilities and a temporary storage area for cleaned containers of asbestos waste. Used as the exit for waste and equipment leaving the regulated area. In an emergency, it may be used to evacuate personnel.

**Authorized person** - Any person authorized by the VA, the Contractor, or government agency and required by work duties to be present in regulated areas.

**Authorized visitor** - Any person approved by the VA; the contractor; or any government agency representative having jurisdiction over the regulated area (e.g., OSHA, Federal and State EPA0..

**Barrier** - Any surface that isolates the regulated area and inhibits fiber migration from the regulated area.

**Containment Barrier** - An airtight barrier consisting of walls, floors, and/or ceilings of sealed plastic sheeting which surrounds and seals the outer perimeter of the regulated area.

**Critical Barrier** - The barrier responsible for isolating the regulated area from adjacent spaces, typically constructed of plastic sheeting secured in place at openings such as doors, windows, or any other opening into the regulated area.

**Primary Barrier** - Plastic barriers placed over critical barriers and exposed directly to abatement work.

**Secondary Barrier** - Any additional plastic barriers used to isolate and provide protection from debris during abatement work.

**Breathing zone** - The hemisphere forward of the shoulders with a radius of about 150 - 225 mm (6 - 9 inches) from the worker's nose.

**Bridging encapsulant** - An encapsulant that forms a layer on the surface of the ACM.

**Building/facility owner** - The legal entity, including a lessee, which exercises control over management and recordkeeping functions relating to a building and/or facility in which asbestos activities take place.

**Bulk testing** - The collection and analysis of suspect asbestos containing materials.

**Certified Industrial Hygienist (CIH)** - A person certified in the comprehensive practice of industrial hygiene by the American Board of Industrial Hygiene.

**Class I asbestos work** - Activities involving the removal of Thermal System Insulation (TSI) and surfacing ACM and Presumed Asbestos Containing Material (PACM).

**Class II asbestos work** - Activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic.

**Clean room/Changing room** - An uncontaminated room having facilities for the storage of employee's street clothing and uncontaminated materials and equipment.

**Clearance sample** - The final air sample taken after all asbestos work has been done and visually inspected. Performed by the VA's professional industrial hygiene consultant/Certified Industrial Hygienist (VPIH/CIH).

**Closely resemble** - The major workplace conditions which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.

**Competent person** - In addition to the definition in 29 CFR 1926.32(f), one who is 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, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.

**Contractor's Professional Industrial Hygienist (CPIH/CIH)** - The asbestos abatement contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of a PIH and may be a certified industrial hygienist (CIH).

**Count** - Refers to the fiber count or the average number of fibers greater than five microns in length with a length-to-width (aspect) ratio of at least 3 to 1, per cubic centimeter of air.

**Crawl space** - An area which can be found either in or adjacent to the work area. This area has limited access and egress and may contain asbestos materials and/or asbestos contaminated soil.

**Decontamination area/unit** - An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and

clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

**Demolition** - The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

**VA Total** - means a building or substantial part of the building is completely removed, torn or knocked down, bulldozed, flattened, or razed, including removal of building debris.

**Disposal bag** - Typically 6 mil thick sift-proof, dustproof, leak-tight container used to package and transport asbestos waste from regulated areas to the approved landfill. Each bag/container must be labeled/marked in accordance with EPA, OSHA and DOT requirements.

**Disturbance** - Activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM or PACM, no greater than the amount that can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or disposal bag which shall not exceed 60 inches in length or width.

**Drum** - A rigid, impermeable container made of cardboard fiber, plastic, or metal which can be sealed in order to be sift-proof, dustproof, and leak-tight.

**Employee exposure** - The exposure to airborne asbestos that would occur if the employee were not wearing respiratory protection equipment.

**Encapsulant** - A material that surrounds or embeds asbestos fibers in an adhesive matrix and prevents the release of fibers.

**Encapsulation** - Treating ACM with an encapsulant.

**Enclosure** - The construction of an air tight, impermeable, permanent barrier around ACM to control the release of asbestos fibers from the material and also eliminate access to the material.

**Equipment room** - A contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

**Fiber** - A particulate form of asbestos, 5 microns or longer, with a length to width (aspect) ratio of at least 3 to 1.

**Fibers per cubic centimeter (f/cc)** - Abbreviation for fibers per cubic centimeter, used to describe the level of asbestos fibers in air.

**Filter** - Media used in respirators, vacuums, or other machines to remove particulate from air.

**Firestopping** - Material used to close the open parts of a structure in order to prevent a fire from spreading.

**Friable asbestos containing material** - Any material containing more than one (1) percent or asbestos as determined using the method specified in appendix A, Subpart F, 40 CFR 763, section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

**Glovebag** - Not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which materials and tools may be handled.

**High efficiency particulate air (HEPA) filter** - An ASHRAE MERV 17 filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

**HEPA vacuum** - Vacuum collection equipment equipped with a HEPA filter system capable of collecting and retaining asbestos fibers.

**Homogeneous area** - An area of surfacing, thermal system insulation or miscellaneous ACM that is uniform in color, texture and date of application.

**HVAC** - Heating, Ventilation and Air Conditioning

**Industrial hygienist (IH)** - A professional qualified by education, training, and experience to anticipate, recognize, evaluate and develop controls for occupational health hazards. Meets definition requirements of the American Industrial Hygiene Association (AIHA).

**Industrial hygienist technician (IH Technician)** - A person working under the direction of an IH or CIH who has special training, experience, certifications and licenses required for the industrial hygiene work assigned. Some states require that an industrial hygienist technician conducting asbestos abatement clearance inspection and clearance air sampling be licensed as an asbestos project monitor.

**Intact** - The ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

**Lockdown** - Applying encapsulant, after a final visual inspection, on all abated surfaces at the conclusion of ACM removal prior to removal of critical barriers.

**National Emission Standards for Hazardous Air Pollutants (NESHAP)** - EPA's rule to control emissions of asbestos to the environment (40 CFR Part 61, Subpart M).

**Negative initial exposure assessment** - A demonstration by the employer which complies with the criteria in 29 CFR 1926.1101 (f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PEL.

**Negative pressure** - Air pressure which is lower than the surrounding area, created by exhausting air from a sealed regulated area through HEPA equipped filtration units. OSHA requires maintaining -0.02" water column gauge inside the negative pressure enclosure.

**Negative pressure respirator** - A respirator in which the air pressure inside the facepiece is negative during inhalation relative to the air pressure outside the respirator facepiece.

**Non-friable ACM** - Material that contains more than 1 percent asbestos but cannot be crumbled, pulverized, or reduced to powder by hand pressure.

**Organic vapor cartridge** - The type of cartridge used on air purifying respirators to remove organic vapor hazardous air contaminants.

**Outside air** - The air outside buildings and structures, including, but not limited to, the air under a bridge or in an open ferry dock.

**Owner/operator** - Any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

**Penetrating encapsulant** - Encapsulant that is absorbed into the ACM matrix without leaving a surface layer.

**Personal sampling/monitoring** - Representative air samples obtained in the breathing zone for one or workers within the regulated area using a filter cassette and a calibrated air sampling pump to determine asbestos exposure.

**Personal protective equipment (PPE)** - equipment designed to protect user from injury and/or specific job hazard. Such equipment may include protective clothing, hard hats, safety glasses, and respirators.

**Permissible exposure limit (PEL)** - The level of exposure OSHA allows for an 8 hour time weighted average. For asbestos fibers, the eight (8) hour time weighted average PEL is 0.1 fibers per cubic centimeter (0.1 f/cc) of air and the 30-minute Excursion Limit is 1.0 fibers per cubic centimeter (1 f/cc).

**Pipe tunnel** - An area, typically located adjacent to mechanical spaces or boiler rooms in which the pipes servicing the heating system in the building are routed to allow the pipes to access heating elements. These areas may contain asbestos pipe insulation, asbestos fittings, or asbestos-contaminated soil.

**Polarized light microscopy (PLM)** - Light microscopy using dispersion staining techniques and refractive indices to identify and quantify the type(s) of asbestos present in a bulk sample.

**Polyethylene sheeting** - Strong plastic barrier material 4 to 6 mils thick, semi-transparent, flame retardant per NFPA 241.

**Positive/negative fit check** - A method of verifying the seal of a facepiece respirator by temporarily occluding the filters and breathing in (inhaling) and then temporarily occluding the exhalation valve and breathing out (exhaling) while checking for inward or outward leakage of the respirator respectively.

**Presumed ACM (PACM)** - Thermal system insulation, surfacing, and flooring material installed in buildings prior to 1981. If the building owner has actual knowledge, or should have known through the exercise of due diligence that other materials are ACM, they too must be treated as PACM. The designation of PACM may be rebutted pursuant to 29 CFR 1926.1101 (b).

**Professional IH** - An IH who meets the definition requirements of AIHA; meets the definition requirements of OSHA as a "Competent Person" at 29 CFR 1926.1101 (b); has completed two specialized EPA approved courses on management and supervision of asbestos abatement projects; has formal training in respiratory protection and waste disposal; and has a minimum of four projects of similar complexity with this project of which at least three projects serving as the supervisory IH. The PIH may be either the VA's PIH (VPIH) of Contractor's PIH (CPIH/CIH).

**Project designer** - A person who has successfully completed the training requirements for an asbestos abatement project designer as required by 40 CFR 763 Appendix C, Part I; (B)(5).

**Assigned Protection factor** - A value assigned by OSHA/NIOSH to indicate the expected protection provided by each respirator class, when the respirator is properly selected and worn correctly. The number indicates the reduction of exposure level from outside to inside the respirator facepiece.

**Qualitative fit test (QLFT)** - A fit test using a challenge material that can be sensed by the wearer if leakage in the respirator occurs.

**Quantitative fit test (QNFT)** - A fit test using a challenge material which is quantified outside and inside the respirator thus allowing the determination of the actual fit factor.

**Regulated area** - An area established by the employer to demarcate where Class I, II, III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work may accumulate; and a work area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed the PEL.

**Regulated ACM (RACM)** - Friable ACM; Category I non-friable ACM that has become friable; Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading or; Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of the demolition or renovation operation.

**Removal** - All operations where ACM, PACM and/or RACM is taken out or stripped from structures or substrates, including demolition operations.

**Renovation** - Altering a facility or one or more facility components in any way, including the stripping or removal of asbestos from a facility component which does not involve demolition activity.

**Repair** - Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

**Shower room** - The portion of the PDF where personnel shower before leaving the regulated area.

**Supplied air respirator (SAR)** - A respiratory protection system that supplies minimum Grade D respirable air per ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.

**Surfacing ACM** - A material containing more than 1 percent asbestos that is sprayed, troweled on or otherwise applied to surfaces for acoustical, fireproofing and other purposes.

**Surfactant** - A chemical added to water to decrease water's surface tension thus making it more penetrating into ACM.

**Thermal system ACM** - A material containing more than 1 percent asbestos applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain.

**Transmission electron microscopy (TEM)** - A microscopy method that can identify and count asbestos fibers.

**VA Professional Industrial Hygienist (VPIH/CIH)** - The Department of Veterans Affairs Professional Industrial Hygienist must meet the qualifications of a PIH, and may be a Certified Industrial Hygienist (CIH).

**VA Representative** - The VA official responsible for on-going project work.

**Visible emissions** - Any emissions, which are visually detectable without the aid of instruments, coming from ACM/PACM/RACM/ACS or ACM waste material.

**Waste/Equipment decontamination facility (W/EDF)** - The area in which equipment is decontaminated before removal from the regulated area.

**Waste generator** - Any owner or operator whose act or process produces asbestos-containing waste material.

**Waste shipment record** - The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

**Wet cleaning** - The process of thoroughly eliminating, by wet methods, any asbestos contamination from surfaces or objects.

### **1.3.3 REFERENCED STANDARDS ORGANIZATIONS:**

The following acronyms or abbreviations as referenced in contract/specification documents are defined to mean the associated names. Names and addresses may be subject to change.

- A. VA Department of Veterans Affairs  
810 Vermont Avenue, NW  
Washington, DC 20420
- B. CFR Code of Federal Regulations  
Government Printing Office  
Washington, DC 20420
- C. EPA Environmental Protection Agency  
401 M St., SW  
Washington, DC 20460  
202-382-3949
- D. MIL-STD Military Standards/Standardization Division  
Office of the Assistant Secretary of Defense  
Washington, DC 20420
- E. NEC National Electrical Code (by NFPA)
- F. NEMA National Electrical Manufacturer's Association  
2101 L Street, N.W.  
Washington, DC 20037
- G. NFPA National Fire Protection Association  
1 Batterymarch Park  
P.O. Box 9101  
Quincy, MA 02269-9101  
800-344-3555
- H. OSHA Occupational Safety and Health Administration  
U.S. Department of Labor  
Government Printing Office  
Washington, DC 20402
- I. DOT Department of Transportation  
Washington, DC 20590

## **1.4 APPLICABLE CODES AND REGULATIONS**

### **1.4.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS:**

- A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are

adopted into this specification and will have the same force and effect as this specification.

- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these specification exists, the most stringent requirement(s) shall be utilized.
- C. Copies of all standards, regulations, codes and other applicable documents, including this specification and those listed in Section 1.5 shall be available at the worksite in the Abatement Contractor's office area/clean room.

#### **1.4.2 ABATEMENT CONTRACTOR RESPONSIBILITY:**

The Asbestos Abatement Contractor (Contractor) shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to any and all aspects of the asbestos abatement project. The Contractor is responsible for providing and maintaining training, accreditations, medical exams, medical records, personal protective equipment (PPE) including respiratory protection including respirator fit testing, as required by applicable Federal, State and Local regulations. The Contractor shall hold the VA and VPIH/CIH consultants harmless for any Contractor's failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of himself, his employees, or his subcontractors. The Contractor will incur all costs of the CPIH/CIH, including all sampling/analytical costs to assure compliance with OSHA/EPA/State requirements related to failure to comply with the regulations applicable to the work.

#### **1.4.3 FEDERAL REQUIREMENTS:**

Federal requirements which govern various aspects of asbestos abatement include, but are not limited to, the following regulations:

- A. Occupational Safety and Health Administration (OSHA)
  - 1. Title 29 CFR 1926 - Construction Standard Requirements - Demolition Work
  - 2. Title 29 CFR 1910.38(a);(b) - Emergency Action Plan
  - 3. Title 29 CFR 1910.132 - Personal Protective Equipment
  - 4. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
  - 5. Title 29 CFR 1910.1200 - Hazard Communication
  - 6. Title 29 CFR 1910.151 - Medical and First Aid
- B. Environmental Protection Agency (EPA)
  - 1. Title 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
  - 2. Title 40 CFR 763 - Asbestos Hazard Emergency Response Act (AHERA) and Asbestos School Hazard Abatement Reauthorization Act (ASHARA).

#### **1.4.4 STATE REQUIREMENTS:**

- A. State requirements that apply to the abatement work include, but are not limited to, the following:
  - 1. State of California



**1.4.5 LOCAL REQUIREMENTS:**

1. City/County of Los Angeles

**1.4.6 PERMITS/LICENSES:**

The Abatement Contractor shall apply for and have on-site all required permits and licenses to perform abatement work as required by Federal, State, and Local regulations.

**1.4.7 POSTING AND FILING OF REGULATIONS:**

Maintain one (1) copy of all applicable federal, state, and local regulations. The regulations will be kept in the Abatement Contractor's office for access. If required, the Contractor shall comply with all applicable State licensing requirements.

**1.4.8 VA RESPONSIBILITIES:**

Prior to commencement of work:

- A. Notify occupants adjacent to regulated areas of project dates and requirements for relocation, if needed. Arrangements must be made prior to starting work for relocation of desks, files, equipment, and personal possessions to avoid unauthorized access into the regulated area. **Note: Notification of adjacent personnel is required by OSHA in 29 CFR 1926.1101 (k) to prevent unnecessary or unauthorized access to the regulated area.**
- B. Submit to the Contractor results of background air sampling; including location of samples, person who collected the samples, equipment utilized, calibration data and method of analysis. During abatement, submit to the Contractor, results of bulk material analysis and air sampling data collected during the course of the abatement. This information shall not release the Contractor from any responsibility for OSHA compliance.

**1.4.9 SITE SECURITY**

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately require any unauthorized person to leave the regulated area and then notify the VA Contracting Officer or VA Representative using the most expeditious means.
- C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area must record their name, affiliation, time in, and time out for each entry.
- D. Access to the regulated area shall be through a single decontamination unit. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos

waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside; however, they shall be sealed with poly sheeting and taped until needed. In any situation where exposure to high temperatures which may result in a flame hazard, fire retardant poly sheeting must be used.

- E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel. A 24 hour security system shall be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.
- F. The Contractor will have the VA's assistance in notifying adjacent personnel of the presence, location and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.
- G. The regulated area shall be locked during non-working hours and secured by VA Representative or Competent Person. The VA Police should be informed of asbestos abatement regulated areas to provide security checks during facility rounds and emergency response.

#### **1.4.10 EMERGENCY ACTION PLAN AND ARRANGEMENTS**

- A. An Emergency Action Plan shall be developed by prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a); (b).
- B. Emergency procedures shall be in written form and prominently posted in the clean room and equipment room of the decontamination unit. Everyone, prior to entering the regulated area, must read and sign these procedures to acknowledge understanding of the regulated area layout, location of emergency exits and emergency procedures.
- C. Emergency planning shall include written notification of police, fire, and emergency medical personnel of planned abatement activities; work schedule; layout of regulated area; and access to the regulated area, particularly barriers that may affect response capabilities.
- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
  - 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
  - 2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.
- F. Telephone numbers of any/all emergency response personnel shall be prominently posted in the clean room, along with the location of the nearest telephone.
- G. The Contractor shall provide verification of first aid/CPR training for personnel responsible for providing first aid/CPR. OSHA requires medical assistance within 3-4 minutes of a life-threatening injury/illness.

Bloodborne Pathogen training shall also be verified for those personnel required to provide first aid/CPR.

- H. The Emergency Action Plan shall provide for a Contingency Plan in the event that an incident occurs that may require the modification of the standard operating procedures during abatement. Such incidents include, but are not limited to, fire; accident; power failure; negative pressure failure; and supplied air system failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that asbestos abatement work is stopped and wetting is continued until correction of the problem.

#### **1.4.11 ACCIDENT PREVENTION**

- A. The Abatement Contractor shall provide and maintain a work environment and procedures which will safeguard the public and VA staff personnel, property, materials, supplies, and equipment which may be adjacent to the Abatement Contractor's regulated areas. The Abatement Contractor will avoid interruptions of VA operations so the project will be completed on schedule.
- B. While performing abatement activities, the Abatement Contractor shall provide all/any required safety barricades, signs, and signal lights. The Abatement Contractor shall comply with all applicable standards related to abatement operations as mandated by OSHA/EPA/State Standards. The Abatement Contractor shall provide a copy of and comply with the pertinent provisions of the latest version of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1.
- C. Whenever the Contracting Officer (CO) becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or VA patients/personnel, the CO shall notify the Abatement Contractor's Competent Person orally, with written confirmation and request immediate corrective action(s) be taken to abate the noncompliant condition. This notice, when delivered to the Abatement Contractor or the Contractor's representative, shall be deemed sufficient notice of noncompliance and that corrective action is required. The Abatement Contractor shall take corrective action immediately upon receipt of the oral/written notice. If the Abatement Contractor fails or refuse to promptly take corrective action, the CO has the option to issue an order to stop all or part of the work until correction actions have been taken. The Abatement Contractor shall have no entitlement to any equitable adjustment of the contract price or extension of the performance schedule based on any stop work order issued under this clause.
- D. The Abatement Contractor shall include the provisions of 1.4.11 in any subcontractor agreement.
- E. The Abatement Contractor shall submit a written plan for implementing 1.4.11. The plan shall include an analysis of any significant hazards to life, limb, and property inherent to abatement work and a plan for controlling these hazards.
- F. The Resident Engineer or other designated VA employee, if designated by the CO, shall serve as the Safety Officer and has authority to enforce the Accident Prevention requirements.

**1.4.12 PRE-CONSTRUCTION MEETING**

Prior to commencing the work, the Contractor shall meet with the VA Certified Industrial Hygienist (VPCIH) to present and review, as appropriate, the items following this paragraph. The Contractor's Competent Person(s) who will be on-site shall participate in the pre-start meeting. The pre-start meeting is to discuss and determine procedures to be used during the project. At this meeting, the Contractor shall provide:

- A. Proof of Contractor licensing.
- B. Proof the Competent Person(s) is trained and accredited and approved for working in this State. Verification of the experience of the Competent Person(s) shall also be presented.
- C. A list of all workers who will participate in the project, including experience and verification of training and accreditation.
- D. A list of and verification of training for all personnel who have current first-aid/CPR training. A minimum of one person per shift must have adequate training.
- E. Current medical written opinions for all personnel working on-site meeting the requirements of 29 CFR 1926.1101 (m).
- F. Current fit-tests for all personnel wearing respirators on-site meeting the requirements of 29 CFR 1926.1101 (h) and Appendix C.
- G. A copy of the Contractor's Asbestos Hazard Abatement Plan. In these procedures, the following information must be detailed, specific for this project.
  - 1. Regulated area preparation procedures;
  - 2. Notification requirements procedure of Contractor as required in 29 CFR 1926.1101 (d);
  - 3. Decontamination area set-up/layout and decontamination procedures for employees;
  - 4. Abatement methods/procedures and equipment to be used; and
  - 5. Personal protective equipment to be used.
- H. At this meeting the Contractor shall provide all submittals as required.
- I. Procedures for handling, packaging and disposal of asbestos waste.
- J. Emergency Action Plan and Contingency Plan Procedures.

**1.5 ABATEMENT PROJECT COORDINATION**

Following are the minimum personnel necessary for coordination of the abatement work.

**1.5.1 PERSONNEL**

- A. Administrative and supervisory personnel shall consist of a qualified Competent Person(s) as defined by OSHA in the Construction Standards and the Asbestos Construction Standard; Contractor Professional Industrial Hygienist and Industrial Hygiene Technicians. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements.
- B. Non-supervisory personnel shall consist of an adequate number of qualified personnel to meet the schedule requirements of the project. Personnel shall meet required qualifications. Personnel utilized on-site shall be pre-approved by the VA representative. A request for approval shall be

submitted for any person to be employed during the project giving the person's name; social security number; qualifications; accreditation card with color picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.

C. Minimum qualifications for Contractor and assigned personnel are:

1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of federal (and state as applicable) EPA and OSHA asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work as required by the state; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; has adequate materials, equipment and supplies to perform the work.
2. The Competent Person has four (4) years of abatement experience of which two (2) years were as the Competent Person on the project; meets the OSHA definition of a Competent Person; has been the Competent Person on two (2) projects of similar size and complexity as this project within the past three (3) years; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.
3. The Contractor Professional Industrial Hygienist/CIH (CPIH/CIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete standard operating procedure for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course or equivalent, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.
4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience within the past three (3) years of similar size and complexity; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

All personnel should be in compliance with OSHA construction safety training as applicable and submit certification.

## 1.6 WORKER PROTECTION

### 1.6.1 TRAINING OF ABATEMENT PERSONNEL

Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have

been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site. The OSHA Construction Safety 10 Hour course shall be required for all on-site contractors' personnel.

#### **1.6.2 PERSONAL PROTECTIVE EQUIPMENT**

Provide, at a minimum, steel toe boots, hard hats, safety glasses, protective clothing, respiratory protection and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). A copy of the hazard assessment shall be provided to the VPIH. The Competent Person and CPIH shall ensure the provision of and the integrity of personal protective equipment worn for the duration of the project.

### **1.7 RESPIRATORY PROTECTION**

#### **1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM**

The Contractor shall develop and implement a written Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.Subpart I;134. ANSI Standard Z88.2-1992 provides excellent guidance for developing a respiratory protection program. All respirators used must be NIOSH approved for asbestos abatement activities. The written RPP shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1)(i - ix) - Respiratory Protection Program.

#### **1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR**

The Respiratory Protection Program Coordinator (RPPC) must be identified and shall have two (2) years experience coordinating RPP of similar size and complexity. The RPPC must submit a signed statement attesting to the fact that the program meets the above requirements.

#### **1.7.3 SELECTION AND USE OF RESPIRATORS**

The procedure for the selection and use of respirators must be submitted to the VA as part of the Contractor's qualifications. The procedure must be written clearly enough for workers to understand. A copy of the Respiratory Protection Program must be available in the clean room of the decontamination unit for reference by employees or authorized visitors.

#### **1.7.4 MINIMUM RESPIRATORY PROTECTION**

Minimum respiratory protection shall be a full face powered air purifying respirator when fiber levels are maintained consistently at or below 0.5 f/cc. A higher level of respiratory protection may be provided or required, depending on fiber levels. Respirator selection shall meet the requirements of 29 CFR 1926.1101 (h); Table 1, except as indicated in this paragraph. Abatement personnel must have a respirator for their exclusive use.

**1.7.5 MEDICAL WRITTEN OPINION**

No employee shall be allowed to wear a respirator unless a physician or other licensed health care professional has provided a written determination they are medically qualified to wear the class of respirator to be used on the project while wearing whole body impermeable garments and subjected to heat or cold stress.

**1.7.6 RESPIRATOR FIT TEST**

All personnel wearing respirators shall have a current qualitative/quantitative fit test which was conducted in accordance with 29 CFR 1910.134 (f) and Appendix A. Quantitative fit tests shall be done for PAPR's which have been put into a motor/blower failure mode

**1.7.7 RESPIRATOR FIT CHECK**

The Competent Person shall assure that the positive/negative pressure user seal check is done each time the respirator is donned by an employee. Head coverings must cover respirator head straps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a user seal check shall preclude that person from wearing a respirator inside the regulated area until resolution of the problem.

**1.7.8 MAINTENANCE AND CARE OF RESPIRATORS:**

The Respiratory Protection Program Coordinator shall submit evidence and documentation showing compliance with 29 CFR 1910.134 (h) Maintenance and care of respirators.

**1.7.9 SUPPLIED AIR SYSTEMS**

If a supplied air system is used, the system shall meet all requirements of 29 CFR 1910.134 and the ANSI/Compressed Gas Association (CGA) Commodity Specification for Air current requirements for Type 1 - Grade D breathing air. Low pressure systems are not allowed to be used on asbestos abatement projects. Supplied Air respirator use shall be in accordance with EPA/NIOSH publication EPA-560-OPTS-86-001 "A Guide to Respiratory Protection for the Asbestos Abatement Industry". The competent person on site will be responsible for the supplied air system to ensure the safety of the worker.

**1.8 WORKER PROTECTION****1.8.1 MEDICAL EXAMINATIONS**

Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. A current physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the medical opinion the person has been evaluated for working in a heat and cold stress environment while wearing personal

protective equipment (PPE) and is able to perform the work without risk of material health impairment.

#### **1.8.2 PROTECTIVE CLOTHING**

Provide boots, booties, hard hats, goggles, clothing, respirators and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). Provide all personnel entering the regulated area with disposable full body coveralls, disposable head covering, and 18 inch boot coverings. The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Provide plastic/rubber disposable gloves for hand protection. Cloth type gloves may be worn under plastic/rubber gloves, but cannot be used alone. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle. Worker protection shall meet the most stringent requirement.

#### **1.8.3 REGULATED AREA ENTRY PROCEDURE**

The Competent Person shall ensure that each time workers enter the regulated area; they remove ALL street clothes in the clean room of the decontamination unit and put on new disposable coveralls, head coverings, a clean respirator, and then proceed through the shower room to the equipment room where they put on non-disposable required personal protective equipment.

#### **1.8.4 DECONTAMINATION PROCEDURE**

The Competent Person shall require all personnel to adhere to following decontamination procedures whenever they leave the regulated area.

- A. When exiting the regulated area, remove disposable coveralls, and ALL other clothes, disposable head coverings, and foot coverings or boots in the equipment room.
- B. Still wearing the respirator and completely naked, proceed to the shower. Showering is MANDATORY. Care must be taken to follow reasonable procedures in removing the respirator to avoid inhaling asbestos fibers while showering. The following procedure is required as a minimum:
  1. Thoroughly wet body including hair and face. If using a PAPR hold blower above head to keep filters dry.
  2. With respirator still in place, thoroughly decontaminate body, hair, respirator face piece, and all other parts of the respirator except the blower and battery pack on a PAPR. Pay particular attention to cleaning the seal between the face and respirator facepiece and under the respirator straps.
  3. Take a deep breath, hold it and/or exhale slowly, completely wetting hair, face, and respirator. While still holding breath, remove the respirator and hold it away from the face before starting to breathe.
- C. Carefully decontaminate the facepiece of the respirator inside and out. If using a PAPR, shut down using the following sequence: a) first cap inlets to filters; b) turn blower off to keep debris collected on the inlet side of the filter from dislodging and contaminating the outside of the unit; c) thoroughly decontaminate blower and hoses; d) carefully decontaminate battery pack with a wet rag being cautious of getting water



in the battery pack thus preventing destruction. **(THIS PROCEDURE IS NOT A SUBSTITUTE FOR RESPIRATOR CLEANING!)**.

- D. Shower and wash body completely with soap and water. Rinse thoroughly.
- E. Rinse shower room walls and floor to drain prior to exiting.
- F. Proceed from shower to clean room; dry off and change into street clothes or into new disposable work clothing.

#### **1.8.5 REGULATED AREA REQUIREMENTS**

The Competent Person shall meet all requirements of 29 CFR 1926.1101 (o) and assure that all requirements for regulated areas at 29 CFR 1926.1101 (e) are met. All personnel in the regulated area shall not be allowed to eat, drink, smoke, chew tobacco or gum, apply cosmetics, or in any way interfere with the fit of their respirator.

### **1.9 DECONTAMINATION FACILITIES**

#### **1.9.1 DESCRIPTION**

Provide each regulated area with separate personnel (PDF) and equipment/waste decontamination facilities (EWDF). Ensure that the PDF are the only means of ingress and egress to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the EWDF. Separate shower facilities must be provided for males/females as per OSHA requirements. See drawings for minimum requirements of each and OSHA 29 CFR 1926.1101, Appendix F.

#### **1.9.2 GENERAL REQUIREMENTS**

All personnel entering or exiting a regulated area must go through the PDF and shall follow the requirements at 29 CFR 1926.1101 (j)(1) and these specifications. All waste, equipment and contaminated materials must exit the regulated area through the W/EDF and be decontaminated in accordance with these specifications. Walls and ceilings of the PDF and W/EDF must be constructed of a minimum of 3 layers of 6 mil opaque fire retardant polyethylene sheeting and be securely attached to existing building components and/or an adequate temporary framework. A minimum of 3 layers of 6 mil poly shall also be used to cover the floor under the PDF and W/EDF units. Construct doors so that they overlap and secure to adjacent surfaces. Weight inner doorway sheets with layers of duct tape so that they close quickly after release. Put arrows on sheets so they show direction of travel and overlap. If the building adjacent area is occupied, construct a solid barrier on the occupied side(s) to protect the sheeting and reduce potential for non-authorized personnel entering the regulated area.

#### **1.9.3 TEMPORARY FACILITIES TO THE PDF AND EWDF**

The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention must be provided at the point of connection to the VA system. Water supply must be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary overhead electric power with ground fault circuit interruption (GFCI) protection. Provide a sub-panel equipped with GFCI protection for all temporary power in the clean room. Provide adequate lighting to provide a minimum of 50 foot candles in the PDF and W/EDF. Provide temporary heat, if needed, to maintain 70°F throughout the PDF and W/EDF.

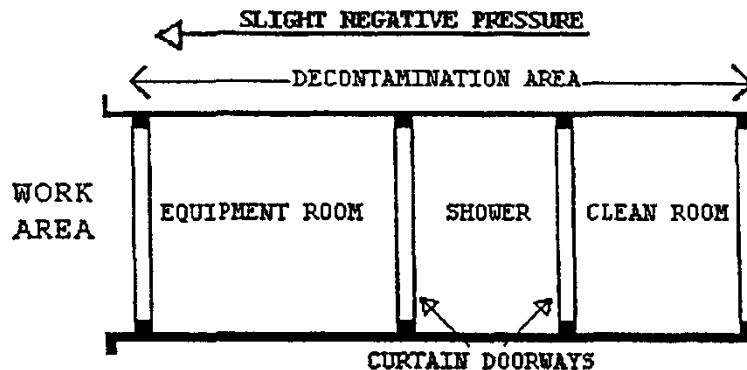
**1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)**

The Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room which is connected to the regulated area. The PDF must be sized to accommodate the number of personnel scheduled for the project. The shower room, located in the center of the PDF, shall be fitted with as many portable showers as necessary to insure all employees can complete the entire decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.

1. Clean Room: The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 3 layers of 6 mil opaque fire retardant poly to provide an air tight room. Provide a minimum of 2 - 900 mm (3 foot) wide 6 mil poly opaque fire retardant doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. Provide 1 storage locker per person. A portable fire extinguisher, minimum 10 pounds capacity, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.
2. Shower Room: The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using air tight walls made from at least 3 layers of 6 mil opaque fire retardant poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Waste water will be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters will be changed a minimum of daily or more often as needed. Filter changes must be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and

clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.

3. Equipment Room: The Competent Person shall provide an equipment room which shall be an air tight compartment for the storage of work equipment/tools, reusable personal protective equipment, except for a respirator and for use as a gross decontamination area for personnel exiting the regulated area. The equipment room shall be separated from the regulated area by a minimum 3 foot wide door made with 2 layers of 6 mil opaque fire retardant poly. The equipment room shall be separated from the regulated area, the shower room and the rest of the building by air tight walls and ceiling constructed of a minimum of 3 layers of 6 mil opaque fire retardant poly. Damp wipe all surfaces of the equipment room after each shift change. Provide an additional loose layer of 6 mil fire retardant poly per shift change and remove this layer after each shift. If needed, provide a temporary electrical sub-panel equipped with GFCI in the equipment room to accommodate any equipment required in the regulated area.
4. The PDF shall be as follows: Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF shall be a minimum of 2 layers of 6 mil opaque fire retardant poly.

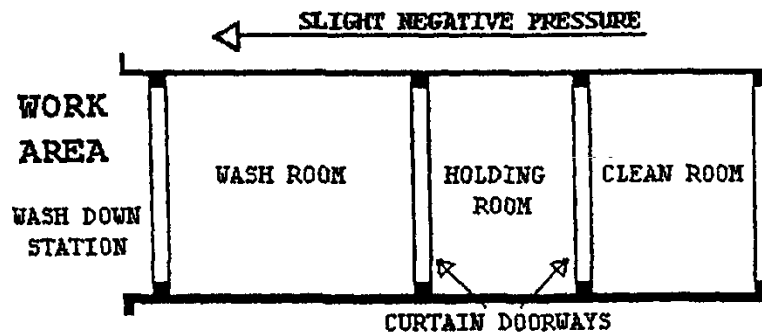


#### 1.9.5 EQUIPMENT/WASTE DECONTAMINATION FACILITY (EWDF)

The Competent Person shall provide a W/EDF consisting of a wash room, holding room, and clean room for removal of waste, equipment and contaminated material from the regulated area. Personnel shall not enter or exit the W/EDF except in the event of an emergency. Clean debris and residue in the W/EDF daily. All surfaces in the W/EDF shall be wiped/hosed down after each shift and all debris shall be cleaned from the shower pan. The W/EDF shall consist of the following:

1. Wash Down Station: Provide an enclosed shower unit in the regulated area just outside the Wash Room as an equipment bag and container cleaning station.

2. Wash Room: Provide a wash room for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the wash room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. Locate the wash room so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the wash room shall be constructed of 2 layers of 6 mil fire retardant poly.
3. Holding Room: Provide a holding room as a drop location for bagged materials passed from the wash room. Construct the holding room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. The holding room shall be located so that bagged material cannot be passed from the wash room to the clean room unless it goes through the holding room. Doorways in the holding room shall be constructed of 2 layers of 6 mil fire retardant poly.
4. Clean Room: Provide a clean room to isolate the holding room from the exterior of the regulated area. Construct the clean room using 2 x 4 wood framing and 2 layers of 6 mil fire retardant poly. The clean room shall be located so as to provide access to the holding room from the building exterior. Doorways to the clean room shall be constructed of 2 layers of 6 mil fire retardant poly. When a negative pressure differential system is used, a rigid enclosure separation between the W/EDF clean room and the adjacent areas shall be provided.
5. The W/EDF shall be as follows: Wash Room leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



#### 1.9.6 EQUIPMENT/WASTE DECONTAMINATION PROCEDURES:

At the wash down station in the regulated area, thoroughly wet clean contaminated equipment and/or sealed polyethylene bags and pass into Wash Room after visual inspection. When passing anything into the Wash Room, close all doorways of the W/EDF, other than the doorway between the wash down station and the Wash Room. Keep all outside personnel clear of the W/EDF. Once inside the Wash Room, wet clean the equipment and/or bags. After cleaning and inspection, pass items into the Holding Room. Close all doorways except the doorway between the Holding Room and the Clean

Room. Workers from the Clean Room/Exterior shall enter the Holding Room and remove the decontaminated/cleaned equipment/bags for removal and disposal. These personnel will not be required to wear PPE. At no time shall personnel from the clean side be allowed to enter the Wash Room.

## **PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT**

### **2.1 MATERIALS AND EQUIPMENT**

#### **2.21.1 GENERAL REQUIREMENTS (ALL ABATEMENT PROJECTS)**

Prior to the start of work, the contractor shall provide and maintain a sufficient quantity of materials and equipment to assure continuous and efficient work throughout the duration of the project. Work shall not start unless the following items have been delivered to the site and the CPIH/CIH has submitted verification to the VA's representative.

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable and combustible materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated area until abatement is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized location.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.
- E. Polyethylene sheeting for walls in the regulated area shall be a minimum of 4-mil, unless otherwise specified by the VA or more stringent State requirement(s). For floors and all other uses, sheeting of at least 6-mil shall be used in widths selected to minimize the frequency of joints. Fire retardant poly shall be used throughout.
- F. The method of attaching polyethylene sheeting shall be agreed upon in advance by the Contractor and the VA and selected to minimize damage to equipment and surfaces. Method of attachment may include any combination of moisture resistant duct tape furring strips, spray glue, staples, nails, screws, lumber and plywood for enclosures or other effective procedures capable of sealing polyethylene to dissimilar finished or unfinished surfaces under both wet and dry conditions.
- G. Polyethylene sheeting utilized for the PDF shall be opaque white or black in color, 6 mil fire retardant poly.
- H. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and waste water filtration system shall be provided by the Contractor.
- I. An adequate number of HEPA vacuums, scrapers, sprayers, nylon brushes, brooms, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements, fall protection devices, water hose to reach all areas in the regulated area, airless spray equipment, and any other tools, materials or equipment required to conduct the abatement project. All electrically operated hand tools, equipment, electric cords shall be connected to GFCI protection.

- J. Special protection for objects in the regulated area shall be detailed (e.g., plywood over carpeting or hardwood floors to prevent damage from scaffolds, water and falling material).
- K. Disposal bags - 2 layers of 6 mil poly for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
- L. The VA shall be provided an advance copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication in the pre-project submittal. Chlorinated compounds shall not be used with any spray adhesive, mastic remover or other product. Appropriate encapsulant(s) shall be provided.
- M. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted in the Clean Room.
- N. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued must be based on a written hazard assessment conducted under 29 CFR 1910.132(d).

#### **2.1.2 NEGATIVE PRESSURE FILTRATION SYSTEM**

The Contractor shall provide enough HEPA negative air machines to continuously maintain a pressure differential of -0.02" water column gauge. The Competent Person shall determine the number of units needed for the regulated area by dividing the cubic feet in the regulated area by 15 and then dividing that result by the cubic feet per minute (CFM) for each unit to determine the number of units needed to continuously maintain a pressure differential of -0.02" WCG. Provide a standby unit in the event of machine failure and/or emergency in an adjacent area.

NIOSH has done extensive studies and has determined that negative air machines typically operate at ~50% efficiency. The contractor shall consider this in their determination of number of units needed to continuously maintain a pressure differential of -0.02" water column gauge. The contractor shall use 8 air changes per hour or double the number of machines, based on their calculations, or submit proof their machines operate at stated capacities, at a 2" pressure drop across the filters.

#### **2.1.3 DESIGN AND LAYOUT**

- A. Before start of work submit the design and layout of the regulated area and the negative air machines. The submittal shall indicate the number of, location of and size of negative air machines. The point(s) of exhaust, air flow within the regulated area, anticipated negative pressure differential, and supporting calculations for sizing shall be provided. In addition, submit the following:
  - 1. Method of supplying power to the units and designation/location of the panels.
  - 2. Description of testing method(s) for correct air volume and pressure differential.

3. If auxiliary power supply is to be provided for the negative air machines, provide a schematic diagram of the power supply and manufacturer's data on the generator and switch.

#### 2.1.4 NEGATIVE AIR MACHINES (HEPA UNITS)

- A. Negative Air Machine Cabinet: The cabinet shall be constructed of steel or other durable material capable of withstanding potential damage from rough handling and transportation. The width of the cabinet shall be less than 30" in order to fit in standard doorways. The cabinet must be factory sealed to prevent asbestos fibers from being released during use, transport, or maintenance. Any access to and replacement of filters shall be from the inlet end. The unit must be on casters or wheels.
- B. Negative Air Machine Fan: The rating capacity of the fan must indicate the CFM under actual operating conditions. Manufacturer's typically use "free-air" (no resistance) conditions when rating fans. The fan must be a centrifugal type fan.
- C. Negative Air Machine Final Filter: The final filter shall be a HEPA filter. The filter media must be completely sealed on all edges within a structurally rigid frame. The filter shall align with a continuous flexible gasket material in the negative air machine housing to form an air tight seal. Each HEPA filter shall be certified by the manufacturer to have an efficiency of not less than 99.97%. Testing shall have been done in accordance with Military Standard MIL-STD-282 and Army Instruction Manual 136-300-175A. Each filter must bear a UL586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
- D. Negative Air Machine Pre-filters: The pre-filters, which protect the final HEPA filter by removing larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. A first stage pre-filter shall be a low efficiency type for particles 10  $\mu$ m or larger. A second stage pre-filter shall have a medium efficiency effective for particles down to 5  $\mu$ m or larger. Pre-filters shall be installed either on or in the intake opening of the negative air machine and the second stage filter must be held in place with a special housing or clamps.
- E. Negative Air Machine Instrumentation: Each unit must be equipped with a gauge to measure the pressure drop across the filters and to indicate when filters have become loaded and need to be changed. A table indicating the cfm for various pressure readings on the gauge shall be affixed near the gauge for reference or the reading shall indicate at what point the filters shall be changed, noting cfm delivery. The unit must have an elapsed time meter to show total hours of operation.
- F. Negative Air Machine Safety and Warning Devices: An electrical/ mechanical lockout must be provided to prevent the fan from being operated without a HEPA filter. Units must be equipped with an automatic shutdown device to stop the fan in the event of a rupture in the HEPA filter or blockage in the discharge of the fan. Warning lights are required to indicate normal operation; too high a pressure drop across filters; or too low of a pressure drop across filters.
- G. Negative Air Machine Electrical: All electrical components shall be approved by the National Electrical Manufacturer's Association (NEMA) and

- Underwriters Laboratories (UL). Each unit must be provided with overload protection and the motor, fan, fan housing, and cabinet must be grounded.
- H. It is essential that replacement HEPA filters be tested using an "in-line" testing method, to ensure the seal around the periphery was not damaged during replacement. Damage to the outer HEPA filter seal could allow contaminated air to bypass the HEPA filter and be discharged to an inappropriate location. Contractor will provide written documentation of test results for negative air machine units with HEPA filters changed by the contractor or documentation when changed and tested by the contractor filters.

#### **2.1.5 PRESSURE DIFFERENTIAL**

The fully operational negative air system within the regulated area shall continuously maintain a pressure differential of -0.02" water column gauge. Before any disturbance of any asbestos material, this shall be demonstrated to the VA by use of a pressure differential meter/manometer as required by OSHA 29 CFR 1926.1101(e)(5)(i). The Competent Person shall be responsible for providing, maintaining, and documenting the negative pressure and air changes as required by OSHA and this specification.

#### **2.1.6 MONITORING**

The pressure differential shall be continuously monitored and recorded between the regulated area and the area outside the regulated area with a monitoring device that incorporates a strip chart recorder. The strip chart recorder shall become part of the project log and shall indicate at least -0.02" water column gauge for the duration of the project.

#### **2.1.7 AUXILIARY GENERATOR**

If the building is occupied during abatement, provide an auxiliary gasoline/diesel generator located outside the building in an area protected from the weather. In the event of a power failure of the general power grid and the VAMC emergency power grid, the generator must automatically start and supply power to a minimum of 50% of the negative air machines in operation.

#### **2.1.8 SUPPLEMENTAL MAKE-UP AIR INLETS**

Provide, as needed for proper air flow in the regulated area, in a location approved by the VA, openings in the plastic sheeting to allow outside air to flow into the regulated area. Auxiliary makeup air inlets must be located as far from the negative air machines as possible, off the floor near the ceiling, and away from the barriers that separate the regulated area from the occupied clean areas. Cover the inlets with weighted flaps which will seal in the event of failure of the negative pressure system.

#### **2.1.9 TESTING THE SYSTEM**

The negative pressure system must be tested before any ACM is disturbed in any way. After the regulated area has been completely prepared, the decontamination units set up, and the negative air machines installed, start the units up one at a time. Demonstrate and document the operation and testing of the negative pressure system to the VA using smoke tubes



and a negative pressure gauge. Verification and documentation of adequate negative pressure differential across each barrier must be done at the start of each work shift.

#### **2.1.10 DEMONSTRATION OF THE NEGATIVE AIR PRESSURE SYSTEM**

The demonstration of the operation of the negative pressure system to the VA shall include, but not be limited to, the following:

- A. Plastic barriers and sheeting move lightly in toward the regulated area.
- B. Curtains of the decontamination units move in toward regulated area.
- C. There is a noticeable movement of air through the decontamination units. Use the smoke tube to demonstrate air movement from the clean room to the shower room to the equipment room to the regulated area.
- D. Use smoke tubes to demonstrate air is moving across all areas in which work is to be done. Use a differential pressure gauge to indicate a negative pressure of at least -0.02" across every barrier separating the regulated area from the rest of the building. Modify the system as necessary to meet the above requirements.

#### **2.1.11 USE OF SYSTEM DURING ABATEMENT OPERATIONS**

- A. Start units before beginning any disturbance of ACM occurs. After work begins, the units shall run continuously, maintaining 4 actual air changes per hour at a negative pressure differential of -0.02" water column gauge, for the duration of the work until a final visual clearance and final air clearance has been successfully completed.  
No negative air units shall be shut down at any time unless authorized by the VA Contracting Officer, verbally and in writing.
- B. Abatement work shall begin at a location farthest from the units and proceed towards them. If an electric failure occurs, the Competent Person shall stop all abatement work and immediately begin wetting all exposed asbestos materials for the duration of the power outage. Abatement work shall not resume until power is restored and all units are operating properly again.
- C. The negative air machines shall continue to run after all work is completed and until a final visual clearance and a final air clearance has been successfully completed for that regulated area.

#### **2.1.12 DISMANTLING THE SYSTEM**

After completion of the final visual and final air clearance has been obtained by the VPIH/CIH, the units may be shut down. The unit exterior surfaces shall have been completely decontaminated; pre-filters are not to be removed and the units inlet/outlet sealed with 2 layers of 6 mil poly immediately after shut down. No filter removal shall occur at the VA site following successful completion of site clearance. OSHA/EPA/DOT asbestos shall be attached to the units.

### **2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA**

#### **2.2.1 GENERAL**

Seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All surfaces in the regulated area must be covered to prevent contamination and to facilitate clean-up.

Should adjacent areas become contaminated as a result of the work, shall immediately stop work and clean up the contamination at no additional cost to the VA. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section 2.2.8; FIRESTOPPING.

#### **2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA**

Place all tools, scaffolding, materials and equipment needed for working in the regulated area prior to erecting any plastic sheeting. All uncontaminated removable furniture, equipment and/or supplies shall be removed by the VA from the regulated area before commencing work. Any objects remaining in the regulated area shall be completely covered with 2 layers of 6-mil fire retardant poly sheeting and secured with duct tape. Lock out and tag out any HVAC/electrical systems in the regulated area

#### **2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA**

Access to the regulated area is allowed only through the personnel decontamination facility (PDF). All other means of access shall be eliminated and OSHA DANGER demarcation signs posted as required by OSHA. If the regulated area is adjacent to, or within view of an occupied area, provide a visual barrier of 6 mil opaque fire retardant poly to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier must be solid and capable of withstanding the negative pressure.

#### **2.2.4 CRITICAL BARRIERS**

Completely separate any operations in the regulated area from adjacent areas using 2 layers of 6 mil fire retardant poly and duct tape. Individually seal with 2 layers of 6 mil poly and duct tape all HVAC openings into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects/openings in the regulated area. Heat must be shut off any objects covered with poly.

#### **2.2.5 PRIMARY BARRIERS**

- A. Cover the regulated area with two layers of 6 mil fire retardant poly on the floors and two layers of 4 mil, fire retardant poly on the walls, unless otherwise directed in writing by the VA representative. Floor layers must form a right angle with the wall and turn up the wall at least 300 mm (12"). Seams must overlap at least 1800 mm (6') and must be spray glued and taped. Install sheeting so that layers can be removed independently from each other. Carpeting shall be covered with three layers of 6 mil poly. Corrugated cardboard sheets must be placed between the bottom and middle layers of poly. Mechanically support and seal with duct tape and glue all wall layers.
- B. Elevator doors must be covered with 2 layers of 6 mil fire retardant poly. The elevator door must be in a positively pressurized area outside the clean room of the PDF.
- C. If stairs and ramps are covered with 6 mil plastic, two layers must be used. Provide 19 mm (3/4") exterior grade plywood treads held in place

with duct tape/glue on the plastic. Do not cover rungs or rails with any isolation materials.

#### **2.2.6 SECONDARY BARRIERS**

A loose layer of 6 mil poly shall be used as a drop cloth to protect the primary layers from debris generated during the abatement. This layer shall be replaced as needed during the work and at a minimum once per work day.

#### **2.2.7 EXTENSION OF THE REGULATED AREA**

If the enclosure of the regulated area is breached in any way that could allow contamination to occur, the affected area shall be included in the regulated area and constructed as per this section. Decontamination measures must be started immediately and continue until air monitoring indicates background levels are met.

#### **2.2.8 FIRESTOPPING**

- A. Through penetrations caused by cables, cable trays, pipes, sleeves, conduits, etc. must be firestopped with a fire-rated firestop system providing an air tight seal.
- B. Firestop materials that are not equal to the wall or ceiling penetrated shall be brought to the attention of the VA Representative. The contractor shall list all areas of penetration, the type of sealant used, and whether or not the location is fire rated. Any discovery of penetrations during abatement shall be brought to the attention of the VA representative immediately. All walls, floors and ceilings are considered fire rated unless otherwise determined by the VA Representative or Fire Marshall.
- C. Any visible openings whether or not caused by a penetration shall be reported by the Contractor to the VA Representative for a sealant system determination. Firestops shall meet ASTM E814 and UL 1479 requirements for the opening size, penetrant, and fire rating needed

### **2.3 MONITORING, INSPECTION AND TESTING**

#### **2.3.1 GENERAL**

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. OSHA requires that the Employee exposure to asbestos must not exceed 0.1 fibers per cubic centimeter (f/cc) of air, averaged over an 8-hour work shift. The CPIH/CIH is responsible for and shall inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH/CIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.

- B. The VA will employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH will perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.
- C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH with review and approval of the VPIH/CIH. An agreement between the CPIH/CIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

#### **2.3.2 SCOPE OF SERVICES OF THE VPIH CONSULTANT**

- A. The purpose of the work of the VPIH/CIH is to: assure quality; adherence to the specification; resolve problems; prevent the spread of contamination beyond the regulated area; and assure clearance at the end of the project. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:
1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
  2. Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.
  3. Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.

4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of conflicts, interpret data, etc.
  5. Task 5: Perform, in the presence of the VA representative, final inspection and testing of a decontaminated regulated area at the conclusion of the abatement to certify compliance with all regulations and VA requirements/specifications.
  6. Task 6: Issue certificate of decontamination for each regulated area and project report.
- B. All documentation, inspection results and testing results generated by the VPIH/CIH will be available to the Contractor for information and consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.
- C. The monitoring and inspection results of the VPIH/CIH will be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated..
- D. All air sampling and analysis data will be recorded on VA Form 10-0018.

### **2.3.3 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH/CIH**

The Contractor's CPIH/CIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH/CIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor's personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in sampling and analysis. The IH Technician shall have successfully completed a NIOSH 582 Course or equivalent and provide documentation. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA AHERA/State Contractor/Supervisor or Abatement Worker and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation on substantially similar projects in size and scope. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT and approved by the VA prior to start of the project. A daily log, shall be maintained by the CPIH/CIH or IH Technician, documenting all OSHA requirements for air personal monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH upon request. The log will contain, at a minimum, information on personnel or area samples, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH/CIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal,

wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH/CIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH/CIH responsibilities. Additionally, the CPIH/CIH will monitor and record pressure readings within the containment daily with a minimum of two readings at the beginning and at the end of a shift, and submit the data in the daily report.

## **2.4 ASBESTOS HAZARD ABATEMENT PLAN**

The Contractor shall have established Asbestos Hazard Abatement Plan (AHAP) in printed form and loose leaf folder consisting of simplified text, diagrams, sketches, and pictures that establish and explain clearly the procedures to be followed during all phases of the work by the Contractor's personnel. The AHAP must be modified as needed to address specific requirements of this project and the specifications. The AHAP(s) shall be submitted for review and approval to the VA prior to the start of any abatement work. The minimum topics and areas to be covered by the AHAP(s) are:

- A. Minimum Personnel Qualifications.
- B. Contingency Plans and Arrangements.
- C. Security and Safety Procedures.
- D. Respiratory Protection/Personal Protective Equipment Program and Training.
- E. Medical Surveillance Program and Recordkeeping.
- F. Regulated Area Requirements - Containment Barriers/Isolation of Regulated Area.
- G. Decontamination Facilities and Entry/Exit Procedures (PDF and EWDF).
- H. Negative Pressure Systems Requirements.
- I. Monitoring, Inspections, and Testing.
- J. Removal Procedures for RACM and ACE.
- K. Removal Procedures for RACM discovered during building demolition shall be provided as per NESHAP.
- L. Removal of Contaminated Soil (if applicable).
- M. Abatement of crawlspaces and/or pipe tunnels if they exist within the facility.
- N. Disposal of RACM and ACE as per NESHAP; OSHA; and DOT for friable asbestos including NESHAP/DOT shipping papers example. Disposal requirements for non-friable waste, as per OSHA requirements.
- O. Regulated Area Decontamination/Clean-up.
- P. Regulated Area Visual and Air Clearance, if required.
- Q. Project Completion/Closeout.

## **2.5 SUBMITTALS**

### **2.5.1 PRE-CONSTRUCTION MEETING SUBMITTALS**

Submit to the VA a minimum of 14 days prior to the pre-start meeting the following for review and approval. Meeting this requirement is a prerequisite for the pre-start meeting for this project:

ASBESTOS ABATEMENT FOR TOTAL DEMOLITION PROJECTS

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Asbestos Hazard Abatement Plan developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH/CIH.
- D. Submit the specifics of the materials and equipment to be used for this project with manufacturer names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
  - 1. Supplied air system, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.
  - 2. Waste water filtration system, shower system, containment barriers.
  - 3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, and fire extinguishers.
  - 4. Respirators, protective clothing, personal protective equipment.
  - 5. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.
- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Personal air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A. And area or clearance air monitoring in accordance with EPA AHERA protocols.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
  - 1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
  - 2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; Resolution
  - 3. List asbestos regulatory citations (e.g., OSHA), notices of violations (e.g., Federal and state EPA), penalties, and legal actions taken against the company including and of the company's officers (including damages paid) in the last 3 years. Provide copies and all information needed for verification.

- I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH/CIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and written respiratory protection program, and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
  1. CPIH/CIH and IH Technician: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of AHAP(s) developed; medical opinion; and current respirator fit test.
  2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects in size/complexity as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
  3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
- J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain language the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of AHAP(s) incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who performs and how is personal air monitoring of abatement workers conducted; a list of references of independent laboratories/IHs familiar with your air monitoring and AHAP(s); and copies of monitoring results of the five referenced projects listed and analytical method(s) used.
- K. Rented equipment must be decontaminated prior to returning to the rental agency.
- L. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants, all MSDS and application instructions.

#### **2.5.2 SUBMITTALS DURING ABATEMENT**

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWA's/EL's. Submit this information daily to the VPIH/CIH.



- B. The CPIH/CIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work:
1. Inspection and approval of the regulated area preparation prior to start of work and daily during work.
  2. Removal of any poly barriers.
  3. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
  4. Packaging and removal of ACM waste from regulated area.
  5. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the VA's representative on a weekly basis.

### **2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT**

The CPIH/CIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. It will also include information on the containment and transportation of waste from the containment with applicable Chain of Custody forms. The report shall include a certificate of completion, signed and dated by the CPIH/CIH, in accordance with Attachment #1. All clearance and perimeter area samples must be submitted. The VA Representative will retain the abatement report after completion of the project and provide copies of the abatement report to VAMC Office of Engineer and the Safety Office.

## **PART 3 - EXECUTION**

### **3.1 PRE-ABATEMENT ACTIVITIES**

#### **3.1.1 PRE-ABATEMENT MEETING**

The VA representative, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH/CIH that all materials and equipment required for the project are on the site, will arrange for a pre-abatement meeting between the Contractor, the CPIH/CIH, Competent Person(s), the VA representative(s), and the VPIH/CIH. The purpose of the meeting is to discuss any aspect of the submittals needing clarification or amplification and to discuss any aspect of the project execution and the sequence of the operation. The Contractor shall be prepared to provide any supplemental information/documentation to the VA's representative regarding any submittals, documentation, materials or equipment. Upon satisfactory resolution of any outstanding issues, the VA's representative will issue a written order to proceed to the Contractor. No abatement work of any kind described in the following provisions shall be initiated prior to the VA written order to proceed.

#### **3.1.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS**

- A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
- B. Upon completion of all preparatory work, the CPIH/CIH will inspect the work and systems and will notify the VA's representative when the work is completed in accordance with this specification. The VA's representative may inspect the

ASBESTOS ABATEMENT FOR TOTAL DEMOLITION PROJECTS

regulated area and the systems with the VPIH/CIH and may require that upon satisfactory inspection, the Contractor's employees perform all major aspects of the approved AHAP, especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation. The operational systems for respiratory protection and the negative pressure system shall be demonstrated for proper performance.

- C. The CPIH/CIH shall document the pre-abatement activities described above and deliver a copy to the VA's representative.
- D. Upon satisfactory inspection of the installation of and operation of systems the VA's representative will notify the Contractor in writing to proceed with the asbestos abatement work in accordance with this specification and all applicable regulations.

### **3.1.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS**

- A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
- B. Upon completion of all preparatory work, the CPIH will inspect the work and systems and will notify the VA's representative when the work is completed in accordance with this specification. The VA's representative may inspect the regulated area and the systems with the VPIH and may require that upon satisfactory inspection, the abatement contractor's employees perform all major aspects of the approved AHAP, especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation. The operational systems for respiratory protection and the negative pressure system shall be demonstrated for proper performance.
- C. The CPIH/CIH shall document the pre-abatement activities described above and deliver a copy to the VA's representative.
- D. Upon satisfactory inspection of the installation of and operation of systems the VA's representative will notify the abatement contractor in writing to proceed with the asbestos abatement work in accordance with this specification.

### **3.2 REGULATED AREA PREPARATIONS**

- A. Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed the PEL. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.
- B. Shut down and lock out/tag out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.
- C. Shut down and lock out/tag out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated

area. Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6-mil polyethylene disposal bags for staging and eventual disposal as asbestos waste.

- D. The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.
- E. The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention. The Contractor shall be responsible for hot water provision to the shower(s).
- F. The Contractor shall not allow unauthorized persons into the regulated area without the written permission of the VPIH.

### **3.3 CONTAINMENT COVERINGS FOR THE REGULATED AREA**

#### **3.3.1 GENERAL**

Seal off the perimeter of the regulated area to completely isolate the abatement project and to contain all airborne asbestos contamination created by the abatement activities. Should the adjacent area past the regulated area become contaminated due to improper work activities, the abatement contractor shall suspend work inside the regulated area, continue wetting, and clean the adjacent areas in accordance with procedures described in these specifications. Any and all costs associated with the adjacent area cleanup shall not be borne by the VA.

#### **3.3.2 PREPARATION PRIOR TO SEALING OFF**

Place all materials, equipment and supplies necessary to isolate the regulated area inside the regulated area. Remove all movable material/equipment as described above and secure all unmovable material/equipment as described above. Properly secured material/equipment shall be considered to be outside the regulated area.

#### **3.3.3 CONTROLLING ACCESS TO THE REGULATED AREA**

Access to the regulated area shall be permitted only through the PDF. All other means of access shall be closed off by proper sealing and DANGER signs posted on the clean side of the regulated area where it is adjacent to or within view of any occupiable area. An opaque visual barrier of at least 4 mil poly shall be provided so that the abatement work is not visible to any building occupants. If the area adjacent to the regulated area is accessible to the public, construct a solid barrier on the public side of the sheeting for protection and isolation of the project. The barrier shall be constructed with nominal 2" x 4" (50mm x 100mm) wood or metal studs 16" (400mm) on centers, securely anchored to prevent movement and covered with a minimum of 1/2" (12.5mm) plywood. Provide an appropriate number of OSHA DANGER signs for each visual and physical barrier. Any alternative method must be given a written approval by the VA's representative.

### 3.3.4 CRITICAL BARRIERS

The regulated area must be completely separated from the adjacent areas, and the outside by at least 2 layers of 6 mil, fire retardant poly and duct tape/spray adhesive. Individually seal all supply and exhaust ventilation openings, lighting fixtures, clocks, doorways, windows, convectors, speakers, and other openings into the regulated area with 2 layers of 6 mil fire retardant poly, and taped securely in place with duct tape/spray adhesive. Critical barriers must remain in place until all work and clearances have been completed. Light fixtures shall not be operational during abatement. Auxiliary lighting shall be provided. If needed, provide plywood squares 6" x 6" x 3/8" (150mm x 150mm x 18mm) held in place with one 6d smooth masonry/galvanized nail driven through the center of the plywood square and duct tape on the poly so as to clamp the poly to the wall/surface. Locate plywood squares at each end, corner, and 4' (1200mm) maximum on centers.

### 3.3.5 PRIMARY/SECONDARY BARRIERS

- A. Floors: Cover the floor of the regulated area with at least two layers of 6 mil, fire retardant poly, turning up the walls at least 12" (300mm). The poly must form a right angle at the floor-wall juncture so there is no radius which can be stepped on, possibly causing detachment of the poly. Spray glue and duct tape must both be used for floor seams. Floor seams must overlap a minimum of 6 feet (1800mm) or be at right angles to each other. The top sheet of poly must be able to be removed independently of the bottom layer. A third loose layer of 6 mil poly shall be used in the area of removal and periodically picked up to reduce contamination of the initial layers.
- B. Walls: All walls in the regulated area, including critical barriers, shall be covered with 2 layers of 4 mil fire retardant poly, mechanically supported and sealed with duct tape and/or spray glue. Tape all joints, including the floor-wall joint, with duct tape/spray glue. All wall joints must overlap at least 6 feet (1800mm).  
NOTE: The VA or State requirements may require the use of 6 mil poly.
- C. Stairs and Ramps: Stairs or ramps covered in poly must be provided with 3/4" (36mm) exterior grade plywood treads securely held in place over the poly. Do not cover stairs or ramps with unsecured poly. Do not cover rungs or rails with any protective materials.

### 3.3.6 EXTENSION OF THE REGULATED AREA

If the regulated area barrier is breached in any manner that could allow the passage of asbestos fibers or debris, the Competent Person shall immediately stop work, continue wetting, and proceed to extend the regulated area to enclose the affected area as per procedures described in this specification. If the affected area cannot be enclosed, decontamination measures and cleanup shall start immediately. All personnel shall be isolated from the affected area until decontamination/cleanup is completed as verified by visual inspection and air monitoring. Air monitoring at completion must indicate background levels.

### 3.4 REMOVAL OF RACM AND ACE

#### 3.4.1 WETTING MATERIALS

- A. Use amended water for the wetting of ACM prior to removal. The Competent Person shall assure the wetting of ACM meets the definition of "adequately wet" in the EPA NESHAP regulation for the duration of the project. A removal encapsulant may be used instead of amended water with written approval of the VA's representative.
- B. Amended Water: Provide water to which a surfactant has been added shall be used to wet the ACM and reduce the potential for fiber release during disturbance of ACM. The mixture must be equal to or greater than the wetting provided by water amended by a surfactant consisting one ounce of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with 5 gallons (19L) of water.

#### 3.4.2 WET REMOVAL OF ACM OTHER THAN AMOSITE

- A. Adequately and thoroughly wet the ACM to be removed prior to removal to reduce/prevent fiber release to the air. Adequate time must be allowed for the amended water to saturate the ACM. Abatement personnel must not disturb dry ACM. Use a fine spray of amended water or removal encapsulant. Saturate the material sufficiently to wet to the substrate without causing excessive dripping. The material must be sprayed repeatedly/continuously during the removal process in order to maintain adequately wet conditions. Removal encapsulants must be applied in accordance with the manufacturer's written instructions. Perforate or carefully separate, using wet methods, an outer covering that is painted or jacketed in order to allow penetration and wetting of the material. Where necessary, carefully remove covering while wetting to minimize fiber release. **In no event shall dry removal occur except in the case of electrical hazards or a greater safety issue is possible!**
- B. If ACM does not wet well with amended water due to coating or jacketing, remove as follows:
  - 1. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
  - 2. Remove saturated ACM in small sections. Do not allow material to dry out. As material is removed, bag material, while still wet into disposal bags. Twist the bag neck tightly, bend over (gooseneck) and seal with a minimum of three tight wraps of duct tape. Clean /decontaminate the outside of the bag of any residue and move to washdown station adjacent to W/EDF.
  - 3. Fireproofing or Architectural Finish on Scratch Coat: Spray with a fine mist of amended water or removal encapsulant. Allow time for saturation to the substrate. Do not oversaturate causing excess dripping. Scrape material from substrate. Remove material in manageable quantities and control falling to staging or floor. If the falling distance is over 20 feet (6 meters), use a drop chute to contain material through descent. Remove residue remaining on the scratch coat after scraping is done using a stiff bristle hand brush. If a removal encapsulant is used, remove residue completely before the encapsulant dries. Periodically re-wet the substrate with amended

water as needed to prevent drying of the material before the residue is removed from the substrate.

4. Fireproofing or Architectural Finish on Wire Lath: Spray with a fine mist of amended water or removal encapsulant. Allow time to completely saturate the material. Do not oversaturate causing excess dripping. If the surface has been painted or otherwise coated, cut small holes as needed and apply amended water or removal encapsulant from above. Cut saturated wire lath into 2' x 6' (50mm x 150mm) sections and cut hanger wires. Roll up complete with ACM, cover in burlap and hand place in disposal bag. Do not drop to floor. After removal of lath/ACM, remove any overspray on decking and structure using stiff bristle nylon brushes. Depending on hardness of overspray, scrapers may be needed for removal.
5. Pipe/Tank/Vessel/Boiler Insulation: Remove the outer layer of wrap while spraying with amended water in order to saturate the ACM. Spray ACM with a fine mist of amended water or removal encapsulant. Allow time to saturate the material to the substrate. Cut bands holding pre-formed pipe insulation sections. Slit jacketing at the seams, remove and hand place in a disposal bag. Do not allow dropping to the floor. Remove molded fitting insulation/mud in large pieces and hand place in a disposal bag. Remove any residue on pipe or fitting with a stiff bristle nylon brush. In locations where pipe fitting insulation is removed from fibrous glass or other non-asbestos insulated straight runs of pipe, remove fibrous material at least 6" from the point it contacts the ACM.

#### **3.4.3 WET REMOVAL OF AMOSITE**

- A. Provide local exhaust ventilation and collection systems to assure collection of amosite fibers at the point of generation. A 300 mm (12") flexible rigid non-collapsing duct shall be located no more than 600 mm (2') from any scraping/brushing activity. Primary filters must be replaced every 30 minutes on the negative air machines. Each scraping/brushing activity must have a negative air machine devoted to it. For pre-molded pipe insulation or cutting wire lathe attach a 1200 mm (4') square flared end piece on the intake of the duct. Support the duct horizontally at a point 600 mm (2') below the work to effect capture. One person in the crew shall be assigned to operate the duct collection system on a continual basis.

#### **3.4.4 REMOVAL OF RACM CONTAMINATED SOIL AND OTHER SPECIAL PROCEDURES:**

- A. Removal of contaminated soil:  
When working on soil contamination, pick up all visible asbestos debris using wet methods if possible after set-up of PDF, EWDF, negative air systems as required. Perform work and decontaminate/clean-up; and complete work as required in these specifications.

### **3.4.5 GLOVEBAG REMOVAL PROCEDURES**

GENERAL: All applicable OSHA requirements and the VA 01570 Specification for glovebag removal shall be followed. The Contractor's AHAP for glovebag removal shall minimally meet the above requirements.

## **3.5 DISPOSAL OF RACM AND ACE WASTE MATERIALS**

### **3.5.1 GENERAL**

The VA must be notified at least 24 hours in advance of any waste removed from the containment. Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA and DOT. The landfill requirements for packaging must also be met. Transport will be in compliance with 49 CFR 100-185 regulations. Disposal shall be done at an approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

### **3.5.2 PROCEDURES**

- A. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification. Waste shall be double-bagged prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall be securely sealed to prevent accidental opening and/or leakage. The top shall be tightly twisted and goose necked prior to tightly sealing with at least three wraps of duct tape. Ensure that unauthorized persons do not have access to the waste material once it is outside the regulated area. All transport containers must be covered at all times when not in use. NESHAP signs must be on containers during loading and unloading. Material shall not be transported in open vehicles. If drums are used for packaging, the drums shall be labeled properly and shall not be re-used.
- B. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second bag.
- C. Asbestos waste with sharp edged components, i.e., nails, screws, lath, strapping, tin sheeting, jacketing, metal mesh, etc., which might tear poly bags shall be wrapped securely in burlap before packaging and, if needed, use a poly lined fiber drum as the second container, prior to disposal.
- D. The VA will be notified of any waste removed from the containment prior to 24 hours.

## **3.6 PROJECT DECONTAMINATION**

### **3.6.1 GENERAL**

The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH/CIH.

### **3.6.2 REGULATED AREA CLEARANCE**

Air testing and other requirements which must be met before release of the Abatement Contractor are specified in Final Testing Procedures.

### 3.6.3 WORK DESCRIPTION

Decontamination includes the cleaning and clearance of the air in the regulated area and the decontamination and removal of the enclosures/facilities installed prior to the abatement work including primary/critical barriers, PDF and EWDF facilities, and negative pressure systems.

### 3.6.4 PRE-DECONTAMINATION CONDITIONS

- A. Before decontamination starts, all ACM and ACE from the regulated area shall be removed, all waste collected and removed, and the secondary barrier of poly removed and disposed of along with any gross debris generated by the work.
- B. At the start of decontamination, the following shall be in place:
  - 1. Primary barriers consisting of two layers of 6 mil poly on the floor and on the walls.
  - 2. Critical barriers consisting of two layers of 6 mil poly which is the sole barrier between the regulated area and the rest of the building or outside.
  - 3. Critical barrier poly over lighting fixtures, clocks, HVAC openings, doorways, windows, convectors, speakers and other openings in the regulated area.
  - 4. Decontamination facilities for personnel and equipment in operating condition and the negative pressure system in operation.

### 3.6.5 CLEANING

Carry out a first cleaning of all surfaces of the regulated area including items of remaining poly sheeting, tools, scaffolding, ladders/staging by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping/air blowing methods. Use each surface of a wetted cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible residue from abated surfaces or poly or other surfaces. Remove all filters in the air handling system and dispose of as ACM waste in accordance with these specifications. The negative pressure system shall remain in operation during this time. Additional cleaning(s) may be needed as determined by the CPIH/VPIH/CIH..

## 3.7 VISUAL INSPECTION AND AIR CLEARANCE TESTING

### 3.7.1 GENERAL

Notify the VA representative 24 hours in advance for the performance of the visual inspection and air clearance testing, if required. The visual inspection and air clearance testing, if needed, will be performed by the VPIH after the CPIH has performed final air clearance testing, if needed.

### 3.7.2 VISUAL INSPECTION

The CPIH/CIH and VPIH/CIH will perform a thorough and detailed visual inspection at the end of the cleaning to determine whether there is any visible residue in the regulated area. If the visual inspection is acceptable, the CPIH/CIH will perform pre-clearance sampling using aggressive clearance as detailed in 40 CFR 763 Subpart E (AHERA) Appendix



A (III)(B)(7)(d). If the sampling results show values below 0.01 f/cc, then the Contractor shall notify the VA's representative of the results with a brief report from the CPIH/CIH documenting the inspection and sampling results and a statement verifying that the regulated area is ready for lockdown encapsulation. The VA reserves the right to utilize their own VPIH/CIH to perform a pre-clearance inspection and testing for verification.

### **3.7.3 AIR CLEARANCE TESTING**

- A. Since the areas will not be re-occupied by personnel after the completion of the abatement, air clearance testing is not required under OSHA/EPA AHERA. States may have rules for clearance testing that might require testing. Consult State rules for the facility and perform clearance testing if needed. After an acceptable visual inspection by the VPIH and // VA Representative // AE Project Engineer //, the VPIH will perform the final testing. If the release criteria are not met, the Abatement Contractor shall repeat the final cleaning and continue decontamination procedures. Additional inspection and testing will be done at the expense of the Abatement Contractor.
- B. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

### **3.7.4 AIR CLEARANCE PROCEDURES**

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc, as measured by PCM methods, if required.
- B. Final Clearance Sampling: If required, the VPIH will secure samples and analyze them according to the NIOSH 7400 method. Samples must be confirmed at an AIHA accredited laboratory if samples are analyzed on-site.

### **3.7.5 CLEARANCE SAMPLING USING PCM**

- A. If required, and after the CPIH/CIH has provided clearance monitoring, the VPIH will perform background, adjacent area, and regulated area samples during construction, and clearance samples as directed by the VA Representative.
- B. The NIOSH 7400 method will be used for clearance sampling with a minimum collection volume based on a fiber density of 100 to 1300 fibers/sq.mm, (0.79 - 10.2 fibers/field) and a minimum detection limit of 0.005 f/cc or less.

## **3.8 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE**

### **3.8.1 COMPLETION OF ABATEMENT WORK**

After thorough decontamination, seal negative air machines with 2 layers of 6 mil poly and duct tape to form a tight seal at the intake/outlet ends before removal from the regulated area. Complete asbestos abatement work upon meeting the regulated area visual and air clearance criteria and fulfilling the following:

- A. Remove all equipment and materials from the project area.
- B. Dispose of all packaged ACM waste as required.

- C. Repair or replace all interior finishes damaged during the abatement work, as required.
- D. Fulfill other project closeout requirements as required in this specification.

#### **3.8.2 CERTIFICATE OF COMPLETION BY CONTRACTOR**

The CPIH/CIH shall complete and sign the "Certificate of Completion" in accordance with Attachment 1 at the completion of the abatement and decontamination of the regulated area.

#### **3.8.3 WORK SHIFTS**

All work shall be done during administrative hours (8:00 AM to 4:30 PM) Monday -Friday excluding Federal Holidays. Any change in the work schedule must be approved in writing by the VA Representative.

**ATTACHMENT #1**

**CERTIFICATE OF COMPLETION**

DATE: \_\_\_\_\_ VA Project #: \_\_\_\_\_  
 PROJECT NAME: \_\_\_\_\_ Abatement Contractor: \_\_\_\_\_  
 VAMC/ADDRESS: \_\_\_\_\_

1. I certify that I have personally inspected, monitored and supervised the abatement work of (specify regulated area or Building):  
 which took place from        /        /        to        /        /
2. That throughout the work all applicable requirements/regulations and the VA's specifications were met.
3. That any person who entered the regulated area was protected with the appropriate personal protective equipment and respirator and that they followed the proper entry and exit procedures and the proper operating procedures for the duration of the work.
4. That all employees of the Abatement Contractor engaged in this work were trained in respiratory protection, were experienced with abatement work, had proper medical surveillance documentation, were fit-tested for their respirator, and were not exposed at any time during the work to asbestos without the benefit of appropriate respiratory protection.
5. That I performed and supervised all inspection and testing specified and required by applicable regulations and VA specifications.
6. That the conditions inside the regulated area were always maintained in a safe and healthy condition and the maximum fiber count never exceeded 0.5 f/cc, except as described below.
7. That all abatement work was done in accordance with OSHA requirements and the manufacturer's recommendations.

CPIH/CIH  
 Signature/Date: \_\_\_\_\_  
 \_\_\_\_\_

CPIH/CIH Print  
 Name: \_\_\_\_\_  
 \_\_\_\_\_

Abatement Contractor  
 Signature/Date: \_\_\_\_\_  
 \_\_\_\_\_

Abatement

Contractor

Print

Name: .....  
.....

ASBESTOS ABATEMENT FOR TOTAL DEMOLITION PROJECTS

**ATTACHMENT #2****CERTIFICATE OF WORKER'S ACKNOWLEDGMENT**

PROJECT NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

PROJECT ADDRESS: \_\_\_\_\_

ABATEMENT CONTRACTOR'S NAME: \_\_\_\_\_

**WORKING WITH ASBESTOS CAN BE HAZARDOUS TO YOUR HEALTH. INHALING ASBESTOS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCERS. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, YOUR CHANCES OF DEVELOPING LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.**

Your employer's contract with the owner for the above project requires that: You must be supplied with the proper personal protective equipment including an adequate respirator and be trained in its use. You must be trained in safe and healthy work practices and in the use of the equipment found at an asbestos abatement project. You must receive/have a current medical examination for working with asbestos. These things shall be provided at no cost to you. By signing this certificate you are indicating to the owner that your employer has met these obligations.

RESPIRATORY PROTECTION: I have been trained in the proper use of respirators and have been informed of the type of respirator to be used on the above indicated project. I have a copy of the written Respiratory Protection Program issued by my employer. I have been provided for my exclusive use, at no cost, with a respirator to be used on the above indicated project.

TRAINING COURSE: I have been trained by a third party, State/EPA accredited trainer in the requirements for an AHERA/OSHA Asbestos Abatement Worker training course, 32 hours minimum duration. I currently have a valid State accreditation certificate. The topics covered in the course include, as a minimum, the following:

- Physical Characteristics and Background Information on Asbestos
- Potential Health Effects Related to Exposure to Asbestos
- Employee Personal Protective Equipment
- Establishment of a Respiratory Protection Program
- State of the Art Work Practices
- Personal Hygiene
- Additional Safety Hazards
- Medical Monitoring
- Air Monitoring
- Relevant Federal, State and Local Regulatory Requirements, Procedures, and Standards
- Asbestos Waste Disposal

MEDICAL EXAMINATION: I have had a medical examination within the past 12 months which was paid for by my employer. This examination included: health history, occupational history, pulmonary function test, and may have included a chest x-ray evaluation. The physician issued a positive written opinion after the examination.

Signature: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Social Security Number: \_\_\_\_\_

Witness: \_\_\_\_\_

**ATTACHMENT #3****AFFIDAVIT OF MEDICAL SURVEILLANCE, RESPIRATORY PROTECTION AND TRAINING/ACCREDITATION**

VA PROJECT NAME AND NUMBER: \_\_\_\_\_

VA MEDICAL FACILITY: \_\_\_\_\_

ABATEMENT CONTRACTOR'S NAME AND ADDRESS: \_\_\_\_\_

## 1. I verify that the following individual

Name: \_\_\_\_\_ Social Security Number: \_\_\_\_\_

who is proposed to be employed in asbestos abatement work associated with the above project by the named Abatement Contractor, is included in a medical surveillance program in accordance with 29 CFR 1926.1101(m), and that complete records of the medical surveillance program as required by 29 CFR 1926.1101(m)(n) and 29 CFR 1910.20 are kept at the offices of the Abatement Contractor at the following address.

Address: \_\_\_\_\_

2. I verify that this individual has been trained, fit-tested and instructed in the use of all appropriate respiratory protection systems and that the person is capable of working in safe and healthy manner as expected and required in the expected work environment of this project.

3. I verify that this individual has been trained as required by 29 CFR 1926.1101(k). This individual has also obtained a valid State accreditation certificate. Documentation will be kept on-site.

4. I verify that I meet the minimum qualifications criteria of the VA specifications for a CPIH.

Signature of CPIH/CIH: \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name of CPIH/CIH: \_\_\_\_\_

Signature of Contractor: \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name of Contractor: \_\_\_\_\_

**ATTACHMENT #4****ABATEMENT CONTRACTOR/COMPETENT PERSON(S) REVIEW AND ACCEPTANCE OF THE VA'S ASBESTOS SPECIFICATIONS**

VA Project Location: \_\_\_\_\_

VA Project #: \_\_\_\_\_

VA Project Description: \_\_\_\_\_

This form shall be signed by the Asbestos Abatement Contractor Owner and the Asbestos Abatement Contractor's Competent Person(s) prior to any start of work at the VA related to this Specification. If the Asbestos Abatement Contractor's/Competent Person(s) has not signed this form, they shall not be allowed to work on-site.

I, the undersigned, have read VA's Asbestos Specification regarding the asbestos abatement requirements. I understand the requirements of the VA's Asbestos Specification and agree to follow these requirements as well as all required rules and regulations of OSHA/EPA/DOT and State/Local requirements. I have been given ample opportunity to read the VA's Asbestos Specification and have been given an opportunity to ask any questions regarding the content and have received a response related to those questions. I do not have any further questions regarding the content, intent and requirements of the VA's Asbestos Specification.

At the conclusion of the asbestos abatement, I will certify that all asbestos abatement work was done in accordance with the VA's Asbestos Specification and all ACM was removed properly and no fibrous residue remains on any abated surfaces.

Abatement Contractor Owner's Signature \_\_\_\_\_ Date \_\_\_\_\_

Abatement Contractor Competent Person(s) \_\_\_\_\_ Date \_\_\_\_\_

- - END- - -



**SECTION 02 83 33.13**  
**LEAD-BASED PAINT REMOVAL AND DISPOSAL**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies abatement and disposal of lead-based paint (LBP) and controls needed to limit occupational and environmental exposure to lead hazards.

**1.2 RELATED WORK**

- A. Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT.
- B. Section 02 41 00, DEMOLITION.
- C. Section 09 91 00, PAINTING.

**1.3 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. Code of Federal Regulations (CFR):
  - CFR 29 Part 1910 .....Occupational Safety and Health Standards
  - CFR 29 Part 1926 .....Safety and Health Regulations for Construction
  - CFR 40 Part 148 .....Hazardous Waste Injection Restrictions
  - CFR 40 Part 260 .....Hazardous Waste Management System: General
  - CFR 40 Part 261 .....Identification and Listing of Hazardous Waste
  - CFR 40 Part 262 .....Standards Applicable to Generators of Hazardous Waste
  - CFR 40 Part 263 .....Standards Applicable to Transporters of Hazardous Waste
  - CFR 40 Part 264 .....Standards for Owners and Operations of Hazardous Waste Treatment, Storage, and Disposal Facilities
  - CFR 40 Part 265 .....Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
  - CFR 40 Part 268 .....Land Disposal Restrictions
  - CFR 49 Part 172 .....Hazardous Material Table, Special Provisions, Hazardous Material Communications, Emergency Response Information, and Training Requirements
  - CFR 49 Part 178 .....Specifications for Packaging

- C. National Fire Protection Association (NFPA):  
NFPA 701-2004 .....Methods of Fire Test for Flame-Resistant  
Textiles and Films
- D. National Institute for Occupational Safety And Health (NIOSH)  
NIOSH OSHA Booklet 3142           Lead in Construction
- E. Underwriters Laboratories (UL)  
UL 586-1996 (Rev 2009) .           High-Efficiency, Particulate, Air Filter  
Units
- F. American National Standards Institute  
Z9.2-2006 .....Fundamentals Governing the Design and Operation  
of Local Exhaust Systems  
Z88.6-2006 .....Respiratory Protection

#### **1.4 DEFINITIONS**

- A. Action Level: Employee exposure, without regard to use of respirations, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period. As used in this section, "30 micrograms per cubic meter of air" refers to the action level.
- B. Area Monitoring: Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially exposed to lead.
- C. 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."
- D. Certified Industrial Hygienist (CIH): As used in this section, refers to an Industrial Hygienist employed by the Contractor and is certified by the American Board of Industrial Hygiene in comprehensive practice.
- E. Change Rooms and Shower Facilities: Rooms within the designated physical boundary around the lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross- contamination.
- F. Competent Person: A person capable of identifying lead hazards in the work area and is authorized by the contractor to take corrective action.
- G. Decontamination Room: Room for removal of contaminated personal protective equipment (PPE).

- H. Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.
- I. 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 size particles.
- J. Lead: Metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.
- K. Lead Control Area: An enclosed area or structure with full containment to prevent the spread of lead dust, paint chips, or debris of lead-containing paint removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.
- L. Lead Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1910.1025. If an employee is exposed for more than 8 hours in a work day, the PEL shall be determined by the following formula. 
$$\text{PEL (micrograms/cubic meter of air)} = 400 / \text{No. of hrs worked per day}$$
- M. Personnel Monitoring: Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1910.1025. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 150 mm to 225 mm (6 to 9 inches) and the center at the nose or mouth of an employee.

### 1.5 QUALITY ASSURANCE

- A. Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1926.62 (I) (1) (i) & (ii). The examination shall not be required if adequate records show that employees have been examined as required by 29 CFR 1926.62(I) without the last year.
- B. Medical Records: Maintain complete and accurate medical records of employees in accordance with 29 CFR 1910.20.
- C. CIH Responsibilities: The Contractor shall employ a certified Industrial Hygienist who will be responsible for the following:
  - 1. Certify Training.

2. Review and approve lead-containing paint removal plan for conformance to the applicable referenced standards.
  3. Inspect lead-containing paint removal work for conformance with the approved plan.
  4. Direct monitoring.
  5. Ensure work is performed in strict accordance with specifications at all times.
  6. Ensure hazardous exposure to personnel and to the environment are adequately controlled at all times.
- D. Training: Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment, in accordance with 29 CFR 1926.62.
- E. Training Certification: Submit certificates signed and dated by the CIH and by each employee stating that the employee has received training.
- F. Respiratory Protection Program:
1. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every 6 months thereafter as required by 29 CFR 1926.62.
  2. Establish and implement a respiratory protection program as required by 29 CFR 1910.134, 29 CFR 1910.1025, and 29 CFR 1926.62.
- G. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1910.1200.
- H. Hazardous Waste Management: The Hazardous Waste Management plan shall comply with applicable requirements of Federal, State, and local hazardous waste regulations and address:
1. Identification of hazardous wastes associated with the work.
  2. Estimated quantities of wastes to be generated and disposed of.
  3. 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 EPA, state, and local hazardous waste permits and /EPA Identification numbers.
  4. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
  5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

6. Spill prevention, containment, and cleanup contingency measures to be implemented.
  7. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.
  8. Cost for hazardous waste disposal according to this plan.
- I. Safety and Health Compliance:
1. In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, state, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1910.1025. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work.
  2. Where specification requirements and the referenced documents vary, the most stringent requirements shall apply.
- J. Pre-Construction Conference: Along with the CIH, meet with the Contracting Officer to discuss in detail the lead-containing paint removal work plan, including work procedures and precautions for the work plan.

#### **1.6 SUBMITTALS**

- A. Submit the following in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Catalog Data:  
Vacuum filters  
Respirators
- C. Instructions: Paint removal materials. Include applicable material safety data sheets.
- D. Statements Certifications and Statements:
  1. Qualifications of CIH: Submit name, address, and telephone number of the CIH selected to perform responsibilities in paragraph entitled "CIH Responsibilities." Provide previous experience of the CIH. Submit proper documentation that the Industrial Hygienist is certified by the American Board of Industrial Hygiene in comprehensive practice, including certification number and date of certification/recertification.

2. Testing Laboratory: Submit the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne concentrations of lead. Provide proper documentation that persons performing the analysis have been judged proficient by successful participation within the last year in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with date of accreditation/reaccreditation.
3. Lead-Containing Paint Removal Plan:
  - a. Submit a detailed job-specific plan of the work procedures to be used in the removal of lead-containing paint. The plan shall include a sketch showing the location, size, and details of lead control areas, location and details of decontamination rooms, change rooms, shower facilities, and mechanical ventilation system.
  - b. Include in the plan, eating, drinking, smoking and restroom procedures, interface of trades, sequencing of lead related work, collected wastewater and paint debris disposal plan, air sampling plan, respirators, protective equipment, and a detailed description of the method of containment of the operation to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air are not exceeded outside of the lead control area.
  - c. Include air sampling, training and strategy, sampling methodology, frequency, duration of sampling, and qualifications of air monitoring personnel in the air sampling portion on the plan.
4. Field Test Reports: Monitoring Results: Submit monitoring results to the Contracting Officer within 3 working days, signed by the testing laboratory employee performing the air monitoring, the employee that analyzed the sample, and the CIH.
5. Records:
  - a. Completed and signed hazardous waste manifest from treatment or disposal facility.
  - b. Certification of Medical Examinations.

c. Employee training certification.

## **PART 2 PRODUCTS**

PAINT REMOVAL PRODUCTS: Submit applicable Material Safety Data Sheets for paint removal products used in paint removal work. Use the least toxic product, suitable for the job and acceptable to the Industrial Hygienist.

## **PART 3 EXECUTION**

### **3.1 PROTECTION**

- A. Notification: Notify the Contracting Officer 20 days prior to the start of any paint removal work.
- B. Lead Control Area Requirements.
  - 1. Establish a lead control area by completely enclosing with containment screens the area or structure where lead-containing paint removal operations will be performed.
  - 2. Contain removal operations by the use of a negative pressure full containment system with at least one change room and with HEPA filtered exhaust.
- C. 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.
- D. Boundary Requirements: Provide physical boundaries around the lead control area by roping off the area [designated on the drawings] or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.
- E. 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.
- F. Change Room and Shower Facilities: Provide clean change rooms and shower facilities within the physical boundary around the designated lead control area in accordance with requirements of 29 CFR 1926.62.
- G. Mechanical Ventilation System:
  - 1. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.57.

2. To the extent feasible, use fixed local exhaust ventilation connected to HEPA filters or other collection systems, approved by the industrial hygienist. Local exhaust ventilation systems shall be designed, constructed, installed, and maintained in accordance with ANSI Z9.2.
  3. If air from exhaust ventilation is recirculated into the work place, the system shall have a high efficiency filter with reliable back-up filter and controls to monitor the concentration of lead in the return air and to bypass the recirculation system automatically if it fails. Air may be recirculated only where exhaust to the outside is not feasible.
- H. Personnel Protection: Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been given appropriate training and protective equipment.
- I. 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.

### **3.2 WORK PROCEDURES**

- A. Perform removal of lead-containing paint in accordance with approved lead-containing paint removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-containing paint is removed in accordance with 29 CFR 1926.62, except as specified herein. Dispose of removed paint chips and associated waste in compliance with Environmental Protection Agency (EPA), federal, state, and local requirements.
- B. Personnel Exiting Procedures:
1. 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 decontamination room, and place them in an approved impermeable disposal bag.
    - c. Shower.



- d. Change to clean clothes prior to leaving the physical boundary designated around the lead-contaminated job site.
- C. Monitoring: Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1910.1025 and as specified herein. Air monitoring, testing, and reporting shall be performed by a CIH or an Industrial Hygiene (IH) Technician who is under the direction of the CIH:
1. The CIH or the IH Technician under the direction of the CIH shall be on the job site directing the monitoring, and inspecting the lead-containing paint removal work to ensure that the requirements of the Contract have been satisfied during the entire lead-containing paint removal operation.
  2. Take personal air monitoring samples on employees who are anticipated to have the greatest risk of exposure as determined by the CIH. In addition, take air monitoring samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
  3. Submit results of air monitoring samples, signed by the CIH, within 24 hours after the air samples are taken. Notify the Contracting Officer immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area.
- D. Monitoring During Paint Removal Work:
1. Perform personal and area monitoring during the entire paint removal operation. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter of air at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air, work shall be stopped and the CIH shall immediately correct the condition(s) causing the increased levels and notify the Contracting Officer immediately.
  2. The CIH shall review the sampling data collected on that day to determine if condition(s) requires any further change in work methods. Removal work shall resume when approval is given by the CIH. The Contractor shall control the lead level outside of the work boundary to less than 30 micrograms per cubic meter of air at all times. As a minimum, conduct area monitoring daily on each shift in

which lead paint removal operations are performed in areas immediately adjacent to the lead control area.

3. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area. If adjacent areas are contaminated, clean and visually inspect contaminated areas. The CIH shall certify that the area has been cleaned of lead contamination.

### **3.3 LEAD-CONTAINING PAINT REMOVAL**

- A. Remove paint within the areas designated on the drawings in order to completely expose the substrate. Take whatever precautions are necessary to minimize damage to the underlying substrate.
- B. Indoor Lead Paint Removal: Select paint removal processes to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste. This paint removal process should be described in the lead-containing paint removal plan. Perform manual sanding and scraping to the maximum extent feasible.
- C. Mechanical Paint Removal and Blast Cleaning: Perform mechanical paint removal and blast cleaning in lead control areas using negative pressure full containments with HEPA filtered exhaust. Collect paint residue and spent grit (used abrasive) from blasting operations for disposal in accordance with EPA, state and local requirements.
- D. Outside Lead Paint Removal: Select removal processes to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste. This paint removal process should be described in the lead-containing paint removal plan. Perform manual sanding and scraping to the maximum extent feasible.

### **3.4 SURFACE PREPARATIONS**

Avoid flash rusting or other deterioration of the substrate. Provide surface preparations for painting in accordance with Section 09 91 00, PAINTING.

### **3.5 CLEANUP AND DISPOSAL**

- A. 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 and wet mopping the area.

- B. Certification: The CIH shall certify in writing that the inside and outside the lead control area air monitoring samples are less than 30 micrograms per cubic meter of air, the respiratory protection for the employees was adequate, the work procedures were performed in accordance with 29 CFR 1926.62, and that there were no visible accumulations of lead-contaminated paint and dust on the worksite. Do not remove the lead control area or roped-off boundary and warning signs prior to the Contracting Officer's receipt of the CIH's certification. Reclean areas showing dust or residual paint chips.
- C. Testing of Lead-Containing Paint Residue and Used Abrasive Where indicated or when directed by the Contracting Officer, test lead containing paint residue and used abrasive in accordance with 40 CFR 261 for hazardous waste.
- D. Disposal:
  - 1. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles.
  - 2. Store removed paint, lead-contaminated clothing and equipment, and lead-contaminated dust and cleaning debris into U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums. Properly labels each drum to identify the type of waste (49 CFR 172) and the date lead-contaminated wastes were first put into the drum. Obtain and complete the Uniform Hazardous Waste Manifest forms from Activity Staff Civil Engineer. Comply with land disposal restriction notification requirements as required by 40 CFR 268:
    - a. At least 14 days prior to delivery, notify the Contracting Officer who will arrange for job site inspection of the drums and manifests by PWC Hazardous Waste Storage Facility personnel.
    - b. As necessary, make lot deliveries of hazardous wastes to the PWC Hazardous Waste Storage Facility to ensure that drums do not remain on the jobsite longer than 90 calendar days from the date affixed to each drum.
  - a. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing which may produce

airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62. Dispose of lead-contaminated waste material at a EPA or state approved hazardous waste treatment, storage, or disposal facility off Government property.

- b. Store 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. 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, store, transport, and dispose lead or lead-contaminated 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.
- E. Disposal Documentation Submit written evidence that the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and state or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

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**SECTION 03 30 53**  
**(SHORT FORM) CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

This section specifies cast-in-place structural concrete and material and mixes for other special concrete mixes, including, but not necessarily limited to white concrete for the seat wall at cemetery entry and the cemetery entry sign wall.

**1.2 RELATED WORK:**

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Concrete roads, walks, and similar exterior site work: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.

**1.3 TOLERANCES:**

- A. ACI 117.
- B. Slab Finishes: ACI 117, F-number method in accordance with ASTM E1155.
- C. Vertical Faces of White Concrete walls: Class A finish.

**1.4 REGULATORY REQUIREMENTS:**

- A. ACI SP-66 ACI Detailing Manual
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.

**1.5 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Concrete Mix Design.
- C. Shop Drawings: Reinforcing steel: Complete shop drawings.
- D. Manufacturer's Certificates: Air-entraining admixture, chemical admixtures, curing compounds.

**1.6 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
  - 117R-06.....Tolerances for Concrete Construction and Materials
  - 211.1-91(R2002)...Proportions for Normal, Heavyweight, and Mass Concrete
  - 211.2-98(R2004)...Proportions for Structural Lightweight Concrete

CAST-IN-PLACE CONCRETE

- 301-05.....Specification for Structural Concrete
- 303.....Standard Specification for Cast-in-Place  
Architectural Concrete
- 304.....Guide for Measuring, Mixing, Transporting, and  
Placing Concrete
- 305R-06.....Hot Weather Concreting
- 306R-2002.....Cold Weather Concreting
- 308.....Standard Practice for Curing Concrete
- SP-66-04 .....ACI Detailing Manual
- 318/318R-05.....Building Code Requirements for Reinforced Concrete
- 347R-04.....Guide to Formwork for Concrete
- C. American Society for Testing and Materials (ASTM):
  - A185-07.....Steel Welded Wire, Fabric, Plain for Concrete  
Reinforcement
  - A615/A615M-08.....Deformed and Plain Billet-Steel Bars for Concrete  
Reinforcement
  - A996/A996M-06.....Standard Specification for Rail-Steel and Axle-  
Steel Deformed Bars for Concrete Reinforcement
  - C31/C31M-08.....Making and Curing Concrete Test Specimens in the  
Field
  - C33-07.....Concrete Aggregates
  - C39/C39M-05.....Compressive Strength of Cylindrical Concrete  
Specimens
  - C94/C94M-07.....Ready-Mixed Concrete
  - C143/C143M-05.....Standard Test Method for Slump of Hydraulic Cement  
Concrete
  - C150-07.....Portland Cement
  - C171-07.....Sheet Material for Curing Concrete
  - C172-07.....Sampling Freshly Mixed Concrete
  - C173-07.....Air Content of Freshly Mixed Concrete by the  
Volumetric Method
  - C192/C192M-07.....Making and Curing Concrete Test Specimens in the  
Laboratory
  - C231-08.....Air Content of Freshly Mixed Concrete by the  
Pressure Method
  - C260-06.....Air-Entraining Admixtures for Concrete
  - C309.....Liquid Membrane-Forming Compounds for Curing  
Concrete
  - C330-05.....Lightweight Aggregates for Structural Concrete

CAST-IN-PLACE CONCRETE

C494/C494M-08.....Chemical Admixtures for Concrete  
C618-08.....Coal Fly Ash and Raw or Calcined Natural Pozzolan  
for Use in Concrete  
C989.....Ground Granulated Blast-Furnace Slag for Use in  
Concrete and Mortars  
D1751-04.....Preformed Expansion Joint Fillers for Concrete  
Paving and Structural Construction (Non-extruding  
and Resilient Bituminous Types)  
D4397-02.....Polyethylene Sheeting for Construction, Industrial  
and Agricultural Applications  
E1155-96(2008)....Determining FF Floor Flatness and FL Floor  
Levelness Numbers

### 1.7 QUALITY ASSURANCE

- A. Architectural Concrete: Where concrete is indicated as architectural concrete exposed to public view, such concrete shall be produced in accordance with applicable requirements of ACI 301 and ACI 303.1. The entry sign wall and the entry seat wall shall be considered architectural concrete.
- B. Site Mock-Ups:
1. Construct site mock-ups for all architectural concrete work and formed concrete that will be exposed to the public in the finish work, not less than 3 meters (10 feet) in length by maximum full exposed height in surface area, for review by the Resident Engineer and acceptance by the Architect, before starting the placement of concrete. Mock-ups panels shall reflect actual radii of convex curve of entry sign wall, (portion to which bronze letters and Veterans Affairs bronze seal would be attached).
  2. Approved site mock-ups for all architectural concrete shall set the standard for the various architectural concrete features: flatness, levelness, vertical face, formed finishes, form jointing, tie hole placement and patching, sack or grouted finish of final concrete surface, and colors of the concrete. The materials and practices used to produce the mock-up panels, including placement, curing and surface treatment applications, shall be in accordance with the reference specifications. Mock ups to remain for the duration of the construction project as reference standard until notified by the architect for removal or demolition.

CAST-IN-PLACE CONCRETE

**PART 2 - PRODUCTS****2.1 FORMS:**

Wood, plywood, metal, or other materials, approved by Resident Engineer, of grade or type suitable to obtain type of finish specified.

**2.2 MATERIALS:**

- A. Portland Cement for Gray Concrete: ASTM C150, Type I or II.
- B. Portland Cement for White Concrete: Shall be white portland cement conforming with the requirements of ASTM C150, for Type I or II, except that it shall contain no more than 0.50% by weight Ferric Oxide, (Fe<sub>2</sub>O<sub>3</sub>).
- C. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalis, and loss on ignition (LOI) not to exceed 5 percent.
- D. Slag: Ground Granulated Blast Furnace Slag: Slag cement shall conform to the requirements of ASTM C-989, and be Grade 100 or Grade 120. If used, slag cement replacement may be 20-40 percent (by mass of cementitious material). Slag cement shall be white or very light in color.
- E. Coarse Aggregate: ASTM C33, Size 67. Size 467 may be used for footings and walls over 300mm (12 inches) thick. Coarse aggregate for applied topping shall be Size 7.
- F. Fine Aggregate: ASTM C33. For white concrete, fine aggregate shall be either white or very light colored, and consist of clean hard, durable particles of silica sand, crushed white marble or white limestone, entirely free from deleterious substances.
- G. Mixing Water: Fresh, clean, and potable.
- H. Air-Entraining Admixture: ASTM C260.
- I. Chemical Admixtures: ASTM C494.
- J. Reinforcing Steel: ASTM A615 or ASTM A996, deformed. See structural drawings for grade.
- K. Expansion Joint Filler: ASTM D1751.
- L. Vapor Barrier shall be per Soil's report recommendation.
- M. Materials for Curing Concrete: ASTM C171. Curing materials for architectural concrete, including any liquid curing compounds or sheet coverings, shall be selected to be non-staining. The curing method selected must be tested for color impact on the surface of white concrete.
- N. Abrasive Aggregates: Aluminum oxide grains or emery grits.

CAST-IN-PLACE CONCRETE



- O. Liquid Densifier/Sealer: 100 percent active colorless aqueous silicate solution.
- P. Grout, Non-Shrinking: Premixed ferrous or non-ferrous, mixed and applied in accordance with manufacturer's recommendations. Grout shall show no settlement or vertical drying shrinkage at 3 days or thereafter based on initial measurement made at time of placement, and produce a compressive strength of at least 18mpa (2500 psi) at 3 days and 35mpa (5000 psi) at 28 days.

### 2.3 CONCRETE MIXES:

- A. Design of concrete mixes using materials specified shall be the responsibility of the Contractor as set forth under Option C of ASTM C94.
- B. Compressive strength at 28 days shall be not less than 25mpa (3000 psi).
- C. Establish strength of concrete by testing prior to beginning concreting operation. Test consists of average of three cylinders made and cured in accordance with ASTM C192 and tested in accordance with ASTM C39.
- D. Maximum slump for vibrated concrete is 100mm (4 inches) tested in accordance with ASTM C143.
- E. Cement and water factor (See Table I):

**TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE**

Concrete: Strength	Non-Air-Entrained		Air-Entrained	
Min. 28 Day Comp. Strength MPa (psi)	Min. Cement kg/m <sup>3</sup> (lbs/c. yd)	Max. Water Cement Ratio	Min. Cement kg/m <sup>3</sup> (lbs/c. yd)	Max. Water Cement Ratio
35 (5000) <sup>1,2</sup>	375 (630)	0.45	385 (650)	0.40
30 (4000) <sup>1,2</sup>	325 (550)	0.55	340 (570)	0.50
25 (3000) <sup>1,2</sup>	280 (470)	0.65	290 (490)	0.55
25 (3000) <sup>1</sup>	300 (500)	*	310 (520)	*

**Explanatory Notes:**

1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 8.3 MPa (1200 psi) in excess of f'c. For concrete strengths above 35 Mpa (5000 psi), the proposed mix design shall achieve a compressive strength 9.7 MPa (1400 psi) in excess of f'c.
2. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.

- \* Determined by Laboratory in accordance with ACI 211.1 for normal concrete.

F. Air-entrainment is required for all exterior concrete and as required for Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS. Air content shall be in conformance with the following table:

**TABLE I - TOTAL AIR CONTENT  
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)**

Nominal Maximum Size of Coarse Aggregate	Total Air Content Percentage by Volume
10mm (3/8 in)	6 to 10
13mm (1/2 in)	5 to 9
19mm (3/4 in)	4 to 8
25mm (1 in)	3 1/2 to 6 1/2
40mm (1-1/2 in)	3 to 6

#### **2.4 BATCHING & MIXING:**

- A. Store, batch, and mix materials as specified in ASTM C94.
1. Job-Mixed: Concrete mixed at job site shall be mixed in a batch mixer in manner specified for stationary mixers in ASTM C94.
  2. Ready-Mixed: Ready-mixed concrete comply with ASTM C94, except use of non-agitating equipment for transporting concrete to the site will not be permitted. With each load of concrete delivered to project, ready-mixed concrete producer shall furnish, in duplicate, certification as required by ASTM C94.

### **PART 3 - EXECUTION**

#### **3.1 FORMWORK:**

- A. Installation shall conform to ACI 347. Forms shall be sufficiently tight to hold concrete without leakage, sufficiently braced to withstand vibration of concrete, and to carry, without appreciable deflection, all dead and live loads to which they may be subjected.
- B. Install forms to line and grade required.
- C. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.
- D. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 3mm (1/8 inch).E. Fabricate forms to result in cast-in-place architectural concrete that complies with ACI 117.
  2. In addition to ACI 117, comply with the following tolerances: Class A, as defined in ACI 347R.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces.
1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.
  2. Do not use rust-stained form-facing material.
- F. Treating and Wetting: Treat or wet contact forms as follows:
1. Coat plywood and board forms with non-staining form sealer. In hot weather, cool forms by wetting with cool water just before concrete is placed.
  2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
  3. Use sealer on reused plywood forms as specified for new material.
- G. Inserts, sleeves, and similar items: Flashing reglets, masonry ties, anchors, inserts, wires, hangers, sleeves, boxes for floor hinges and other items specified as furnished under this and other sections of specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned and built into construction, maintained securely in place and sealed or covered as necessary to prevent the incidental intrusion of concrete mix.
- H. Vapor Barrier. Install under interior floor slabs on grade. Lap joints 6" in the direction of concrete spreading and tape seal. Seal the joints at walls and around penetrations with tape. Cover barrier with 2" layer of clean damp sand.
- I. Construction Tolerances:
1. Contractor is responsible for setting and maintaining concrete formwork to assure erection of completed work within tolerances specified to accommodate installation or other rough and finish materials. Remedial work necessary for correcting excessive tolerances is the responsibility of the Contractor. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Government.

2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

### **3.2 REINFORCEMENT:**

Details of concrete reinforcement, unless otherwise shown, shall be in accordance with ACI 318 and ACI SP-66. Support and securely tie reinforcing steel to prevent displacement during placing of concrete.

### **3.3 PLACING CONCRETE:**

- A. Remove water from excavations before concrete is placed. Remove hardened concrete, debris and other foreign materials from interior of forms, and from inside of mixing and conveying equipment. Obtain approval of Resident Engineer before placing concrete. Provide screeds at required elevations for concrete slabs.
- B. Before placing new concrete on or against concrete which has set, existing surfaces shall be roughened and cleaned free from all laitance, foreign matter, and loose particles.
- C. Convey concrete from mixer to final place of deposit by method which will prevent segregation or loss of ingredients. Do not deposit in work concrete that has attained its initial set or has contained its water or cement more than 1-1/2 hours. Do not allow concrete to drop freely more than 1500 mm (5 feet) in unexposed work nor more than 900 mm (3 feet) in exposed work. Place and consolidate concrete in horizontal layers not exceeding 300 mm (12 inches) in thickness. Consolidate concrete by spading, rodding, and mechanical vibrator. Do not secure vibrator to forms or reinforcement. Vibration shall be carried on continuously with placing of concrete.
- D. Hot weather placing of concrete: Follow recommendations of ACI 305R to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete.
- E. Cold weather placing of concrete: Follow recommendations of ACI 306R, to prevent freezing of thin sections less than 300mm (12 inches) and to permit concrete to gain strength properly, except that use of calcium chloride shall not be permitted without written approval from Resident Engineer.

**3.4 PROTECTION AND CURING:**

Protect exposed surfaces of concrete from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperature. Curing method shall be subject to approval by Resident Engineer.

**3.5 FORM REMOVAL:**

Forms remain in place until concrete has a sufficient strength to carry its own weight and loads supported. Removal of forms at any time is the Contractor's sole responsibility.

**3.6 SURFACE PREPARATION:**

Immediately after forms have been removed and work has been examined and approved by Resident Engineer, remove loose materials, and patch all stone pockets, surface honeycomb, or similar deficiencies with cement mortar made with 1 part portland cement and 2 to 3 parts sand.

**3.7 FINISHES:****A. Vertical Surface Finishes:**

1. Exterior Exposed Areas (finished): Finished areas, unless otherwise shown, shall be given a sack finish--often referred to as a grout finish--of uniform color and shall have a smooth finish treated as follows:
  - a. After concrete has hardened and laitance, fins and burrs have been removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone or stone.
  - b. Apply grout composed of 1 part portland cement and 1 part clean, fine sand (smaller than 600 micro-m (No. 30) sieve). Work grout into surface of concrete with cork floats or fiber brushes until all pits and honeycomb are filled.
  - c. For white concrete surfaces, apply grout composed of 1 part white portland cement and 1 part fine white or very light silica sand (smaller than 600 micro-m (No. 30) sieve). Work grout paste into surface of concrete with cork floats or fiber brushes until all pits and honeycomb are filled.
  - d. After grout has hardened, but still plastic, remove surplus grout with a sponge rubber float and by rubbing with clean burlap.
  - e. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish for any area in same day.

Confine limits of finished areas to natural breaks in wall surface. Do not leave grout on concrete surface overnight.

**B. Slab Finishes:**

1. Scratch Finish: Slab surfaces to receive a bonded applied cementitious application shall all be thoroughly raked or wire broomed after partial setting (within 2 hours after placing) to roughen surface to insure a permanent bond between base slab and applied cementitious materials.
2. Floating: Allow water brought to surface by float used for rough finishing to evaporate before surface is again floated or troweled. Do not sprinkle dry cement on surface to absorb water.
3. Float Finish: Ramps, both interior and exterior, equipment pads, and slabs to receive non-cementitious materials, except as specified, shall be screened and floated to a smooth dense finish. After first floating, while surface is still pliable, surfaces shall be checked for alignment using a straightedge or template. Correct high spots by cutting down with a trowel or similar tool and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections on floated finish by rubbing or dry grinding. Refloat the slab to a uniform sandy texture.
4. Broom Finish: Finish all exterior slabs, and ramps, unless otherwise indicated on Drawings, with a bristle brush moistened with clear water after the surfaces have been floated.
5. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:

Slab on grade & Shored suspended slabs	Unshored suspended slabs
Specified overall value $F_F$ 50/ $F_L$ 33	Specified overall value $F_F$ 50
Minimum local value $F_F$ 25/ $F_L$ 17	Minimum local value $F_F$ 25

**3.8 RETAINING WALLS:**

- A. Concrete for retaining walls shall be as shown and air-entrained.
- B. Install and construct expansion and contraction joints, waterstops, weep holes, reinforcement and fence post sleeves as shown on drawings.
- C. Finish exposed surfaces to match adjacent concrete surfaces, new or existing.

CAST-IN-PLACE CONCRETE

- D. Porous backfill and perforated drain pipe shall be placed as shown on drawings.

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**SECTION 03 48 24**  
**PRE-CAST CONCRETE COLUMBARIUM UNITS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This section covers the manufacture and installation of precast concrete columbarium units, as shown on the drawings and specified herein, including but not limited to: the steel reinforcement, steel embedment plates, required sleeves, finished exposed surfaces, preparation of setting surface, adhesive, columbarium fasteners, and niche cover anchor clip assemblies.
- B. Acceptable designs of the columbarium unit components are provided as shown on the Drawings. The Contractor may use this design for this Work or may propose alternate designs of the corresponding components as follows:
  - 1. Design for alternate columbarium units shall comply with the design criteria as per Articles 1.3.F. and further, if required by the Contractor, shall comply with the functional tests as per Article 1.3.G. of this Specification.
  - 2. Unless indicated otherwise, all provisions of this Specification shall apply to the Contractor proposed design.
- C. The Government may accept or reject part or all of any design proposed by the Contractor.

**1.2 RELATED DOCUMENTS**

- A. Section 03 30 53, (SHORT FORM) CAST-IN-PLACE CONCRETE for Cast-in-place concrete work.
- B. Section 04 20 00, UNIT MASONRY.
- C. Section 04 43 00, CUT STONE for niche covers and memorial plaques.
- D. Section 04 73 01, COLUMBARIUM NICHE COVERS MARBLE
- E. Section 07 92 00, JOINT SEALANTS, Materials and Workmanship for sealant application.
- F. Section 31 20 00, EARTH MOVING

**1.3 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Prior to commencement of work, Contractor shall submit documentation regarding the experience of his precast concrete supplier in the design and manufacture of Precast Concrete structures and custom columbarium units.



- B. Precast concrete manufacturer's qualified Registered Professional Structural Engineer to certify that precast reinforced concrete conforms to specified requirements.
- C. Codes and regulations of the Federal, State and County authorities shall apply.
- D. Fabricate to dimensions shown or approved. Replace or correct Columbarium Units that do not comply with the individual dimensions and tolerances.
- E. Before starting production of precast concrete Columbarium Units, furnish at the site, four complete Precast Concrete Columbarium Units, two five niche high and two three niche high, one of each height to be closed at both ends and the other of each height to be open at one end to demonstrate quality of construction and anticipated tolerances of the castings. Commence production of Columbarium Units only after written approval has been obtained from the Resident Engineer/Contracting Officer's Representative (RE/COR). Approved precast units of both types are to remain onsite as a reference standard for quality of construction until all precast units have been delivered and accepted by the RE/COR upon consultation with the appropriate Design Team Member(s).
- F. Design Criteria:
  - 1. The Columbarium Units shall be of the following type and size:
    - a. Type: Precast concrete, reinforced, predrilled for anchorages and weld plates affixed.
    - b. Size: Interior and exterior dimensions as indicated on plans.
  - 2. Columbarium top shall be capable of structurally supporting imposed service live load of no less than 240 Kgs./Square Meter (50 lb./ft<sup>2</sup>), and dead loads based on stone veneer thickness and heights, including material composition and element section properties, mortar and grout, and dead loads based on stone top element sectional properties. All design loads shall be applied directly over the vertical webs of the precast niche units and not on the unsupported top webs between the vertical webs.
  - 3. The Contractor shall submit to the RE/COR for review and approval 5 sets of design documentation showing structural design of the complete Columbarium. This documentation shall include dimensions, methods of construction, and calculations. All design calculations

and drawings shall be signed and sealed by qualified Professional Structural Engineer.

G. Functional Load Tests: If required by the RE/COR, a functional load test will be made at the Contractor's expense to insure that the columbarium proposed by the Contractor, as furnished, will be capable of supporting loads stated in Article 1.3.F.2. The functional test will consist of two loading conditions:

1. Unconfined Loading: The columbarium will be placed on a flat surface with no support against the sides. The entire top of the columbarium will be subjected to a simulated uniform load of live load of 240 Kgs./Square Meter (50 lb./ft<sup>2</sup>) and required dead load simulating stone veneer, mortar, and grout as they will be installed. The load will be maintained for no less than 72 hours. At end of the loading period, the concrete elements shall be free of all structural distress.

#### **1.4 MANUFACTURER / INSTALLER QUALIFICATIONS**

- A. Precast concrete columbarium units shall be product of manufacturer/installer whom has a minimum of 5 years experience in fabrication and erection of the precast concrete columbarium units similar in material design and extent to that indicated on the drawings and specified herein.
- B. Precast concrete fabrication and casting plant for columbaria units shall be a certified member in good standing of the Precast Concrete Institute (PCI) or the National Precast Concrete Association (NPCA). Precast concrete manufacturing plant shall be certified under the PCI plant program at the time of bidding in the following categories at the minimum:
  1. Group A: Architectural Products, Section A1 - Architectural Precast Products.
  2. Group C or CA: Commercial Products, Section C1 or C1A - Precast Concrete Products (No Prestressed Reinforcement)
- C. Personnel Qualification: A PCI certified manufacturer shall employ a minimum of one person regularly present in the plant who is certified by PCI for Plant Quality Personnel, Level II.
- D. Supply and Installation of fastener system shall be by a product manufacturer and installer, both whom have had a minimum of 3 years experience in installation of similar design as indicated on the drawing.

- E. Installation of niche fronts will be performed by those companies who have had 3 years experience in installation of similar design as indicated in the drawings and specified herein.

#### **1.5 SUSTAINABILITY REQUIREMENTS**

- A. Materials in this section may contribute towards contract compliance with sustainability requirements.
- B. Blended Cement: It is the intent of this specification to reduce CO2 emissions and other environmentally detrimental effects resulting from the production of portland cement by requiring that all concrete mixes, in aggregate, utilize blended cement mixes to displace portland cement typically included in conventional construction. Provide the following submittals:
1. Copies of concrete design mixes for all installed concrete.
  2. Copies of typical regional baseline concrete design mixes for all compressive strengths used on the Project.
  3. Quantities in cubic yards of each installed concrete mix.
- C. Biobased Material: For products designated by the USDA's BioPreferred® program, provide products that meet or exceed USDA recommendations for biobased content, subject to the products compliance with performance requirements in this Section. For more information regarding the product categories covered by the BioPreferred® program, please visit <http://www.biopreferred.gov/>.

#### **1.6 REGULATORY REQUIREMENTS FOR RECYCLED CONTENT**

- A. Products and Materials with Post-Consumer Content and Recovered Materials Content:
1. Contractor is obligated by contract to satisfy Federal mandates for procurement of products and materials meeting recommendations for post-consumer content and recovered materials content; the list of designated product categories with recommendations has been compiled by the EPA - refer to <http://www.epa.gov/wastes/conserves/tools/cpg/products/>
  2. Materials or products specified by this section may be obligated to satisfy this Federal mandate and Comprehensive Procurement Guidelines program.
  3. The EPA website also provides tools such as a Product Supplier Directory search engine and product resource guides.
- B. Fulfillment of regulatory requirements does not relieve the Contractor of satisfying sustainability requirements stipulated by Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS, as it relates to recycled content;

additional product and material selections with recycled content may be required, as determined by Contractor's Sustainability Action Plan..

#### **1.7 ALLOWABLE TOLERANCES**

- A. In addition to tolerances of individual elements required by American Concrete Institute Publication 533.3R, erection tolerances shall be as follows (note the tightest tolerance shall take precedence over looser tolerances):
1. Variation of anchors and fasteners from dimensions specified: 3 mm, (1/8").
  2. Variation in overall dimensions of precast element (height and width): 3 mm, (1/8").
  3. Maximum differential between adjacent units in erected position: 3 mm, (1/8").
  4. Variation in thickness of precast panels and elements: 3 mm, (1/8").
  5. Maximum vertical differential between adjacent columbarium units in installed position: 3mm, (1/8-inch).

#### **1.8 SUBMITTALS**

- A. In accordance with Division 1 Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:
1. Samples: Submit sample of all fastening systems, mounting hardware and exposed surface finishes including, but not limited to, the following:
    - a. Stainless Steel Angle and stainless steel clip for attaching the rosette tamper proof screw.
    - b. Stainless Steel Bolts, Nuts and Washers.
    - c. Tamper Proof Stainless Steel Bolt (Snake-eye or TORX security) as approved in the submittals).
    - d. Stainless Steel Rosette.
    - e. Stainless Steel Expansion Anchors, Bolts and pins.
    - f. Stainless Steel Ferrule loop insert (as applicable).
    - g. Shims.
    - h. neoprene clear or white washers (3/4" - 7/8" diameter) for behind the rosette. Thickness of washer as needed to keep the edge of the rosette from touching the face of the cover when tightened and the edge shall be no more than 3/32" from face of cover.
    - i. Anti-graffiti sealer coating as approved in the submittal process.

- j. Adhesives and grouts.
- k. Stainless steel weld plate assembly.
- 2. Shop Drawings: Complete shop and erection drawings of all precast concrete columbarium units, showing:
  - a. All dimensions and details of construction.
  - b. Installation and relation to adjoining work:
    - 1) Show reinforcements, anchorage, attachments, inserts, location of all pre-drilled sleeves, weld plates and other items to be installed in the work of other trades, joint treatment, joint alignment coordinated with cap stone joints, and other work required for a complete installation.
    - 2) Show that the overall length of the wall, with multiple precast units is to be set with the indicated overall in place length, within the allowable tolerances (show the installation tolerances).
    - 3) For back to back precast niche units show that the web centerlines for the back to back units will align, for the locations below the cap joints, within the allowable tolerances.
    - 4 Detail where the precast niche units are to be set in the field so the centerline of niche webs will align with the centerline of cap joints above, within the allowable tolerances, when the drawings or details indicate this alignment.
    - 5) Provide evidence that the Contractor to be installing the cast-in-place concrete foundations for the columbarium and pier units has been contacted prior to any work relating to the footings for the columbarium construction, and that the construction of the concrete support (foundations) work has been coordinated (maximum allowable construction tolerances and finish, clearly established) with the precast columbarium unit manufacturer and installer.
    - 6) Any other work required for a complete installation.
- 3. Production Drawings:
  - a. Elevation view of each structural element.
  - b. Planametric (axonometric) view of unit.
  - c. Sections and details to show quantities and position of reinforcing steel, anchors, inserts, and essential embedded and

non-embedded hardware for fabrication, handling, transportation and installation.

- d. Lifting and erection inserts.
  - e. Dimensions and finishes.
  - f. Method of transportation.
  - g. Method of erection and handling.
4. Erection Drawings:
- a. Elevation view of each typical wall segment of interconnected precast niche units, with the overall in place length and position of the precast niche assembly.
  - b. Section view of the precast niche units, as they are to be installed, with the critical alignment elements and field placed dimensions indicated. For double sided units, as an example, the face of niche unit to face of backed up niche unit shall be indicated with the construction tolerances for the in place units indicated. Clearly indicate how the units are going to be set in the field to achieve the intended installed conditions.
  - c. Provide setting drawing(s) that indicate how the precast niche units are to be positioned on the foundations, to meet the design drawings. The setting drawings shall be submitted based upon the field conditions for the foundations for the segments upon which the precast niche units are to be set. Any discrepancies that exist greater than 1/4" from the design drawings shall be clearly indicated as the foundations are to be constructed within this tolerance. The setting of the precast concrete niche units shall not begin until this information has been provided and approved by the RE/COR, or adjustments made to the foundations that are acceptable to the RE/COR.
  - d. Provide coordination drawings indicating the locations for the weld plates in the precast niche units as well as in the foundations, and coordinate this information so the weld plates are installed in the correct locations to align within allowable tolerances.
5. Manufacturer's Literature and Data:
- a. Each type of Concrete Fastener, including adhesive and anchor devices.
  - b. Instructions for final cleaning.

- c. Concrete stain/coating, including color charts of manufacturers standard color palette. (If applicable for this project)
  - d. Written instructions of how the exposed concrete of the precast niche units is to be cleaned and prepared prior to application of the approved stain/coating indicated above.
6. Certificates:
- a. Installer's qualifications documenting the quality and quantity of experience of the precast concrete installer in the installation of Precast Concrete structures and custom units.
  - b. Manufacturer of the precast niche units shall provide a written certification, prior to shipping the materials, that the products being shipped have been checked and that they meet the dimensional criteria as indicated, within the allowable tolerances for individual units, and that they can be assembled as part of the identified wall segments, within the allowable in place dimensions indicated, within the allowable tolerances indicated. The above manufacturing certifications shall be provided no later than immediately before the units are offloaded at the site. Units that do not meet these criteria shall either be returned or marked in such a manner that indicates they are not to be used for the project work. It is the Contractor's responsibility to ensure that all units that are installed in the project work have been certified by the manufacturer of the units. The Contractor shall be responsible for disposal of any units that are not acceptable for installation in the project work at no cost to the Government.
  - c. Manufacturer's PCI or NPCA verification of plant certification.
  - d. Manufacturer's qualifications specifying precast concrete columbarium units meet the requirements of ACI 533.3R and as specified.

#### **1.9 DELIVERY STORAGE**

- A. Ship precast concrete columbarium units to site with adequate protection to prevent chipping, breaking and other damage. Materials shall be marked giving proper identifications and location. Store materials in protected areas to prevent damage, injurious effects of weather and inclusion of foreign matter.

**1.10 COORDINATION**

- A. Coordinate the manufacture and erection of precast concrete columbarium units with related work of other sections of the Specifications.

Provide templates for inserts and other devices for anchoring precast concrete columbarium units to the work of other trades, in sufficient time to be built into adjoining construction. Perform cutting, fitting and other related work in connection with erection of precast concrete columbarium unit work. See Shop Drawing section for details regarding the coordination of work.

**1.11 GUARANTEE**

- A. Guarantee precast concrete columbarium unit work, including anchorage, joint treatment and related components to be free from all defects in materials and workmanship, including cracking and spalling, and after erection, completed work will be subject to terms of "Guarantee" article in Division 1 Specification Sections except that guarantee period is one year.

**1.12 APPLICABLE PUBLICATIONS**

- A. The publications listed below from a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):
- QQ-S-766C (5).....Steel Plates, Sheets, and Strip-Corrosion  
Resisting
- QQ-W-423B.....Wire, Steel, Corrosive-Resisting
- TT-S-00227E (3).....Sealing Compound Elastomeric Type, Multi-  
Component (For Caulking, Sealing, and  
Glazing In Building And Other Structures)
- TT-S-00230C (2).....Sealing Compound: Elastomeric Type, Single  
Component (For Caulking, Sealing and Glazing  
in Building and Other Structures)
- C. American Concrete Institute (ACI) Publications:
- ACI 533.3R-70.....Fabrication, Handling and Erection of  
Precast Concrete.
- D. American Society for Testing Materials (ASTM) Standards:
- A36/A36M-08.....Structural Steel
- A82/A82M-07.....Steel Wire, Plain, for Concrete  
Reinforcement



A185/A185M-07.....Welded Steel Wire Fabric for Concrete  
Reinforcement.

A615/A615M-08b.....Deformed and Plain Billet-Steel Bars for  
Concrete Reinforcement.

C33-08.....Concrete Aggregates

C150-07.....Portland Cement

A276-10.....Standard Specification for Stainless Steel  
Bars and Shapes

E. American Welding Society (AWS) Publications:

AWS D1.1-90.....Structural Welding Code

AWS D1.4-80.....Welding Reinforcing Steel

**PART 2 - PRODUCTS**

**2.1 ACCEPTABLE MANUFACTURER/ DESIGN**

A. Manufacturer's that have previously completed at least one successful National Cemetery Association (NCA) columbarium project are deemed to be acceptable for processing their units through the procedures according to these specifications and the drawings.

B. Manufacturer's that do not have previous successful experience for a NCA columbarium project may be selected by the Contractor for the project. Contractor is hereby notified that the submittal process for a manufacturer with no previous NCA experience with a successful columbarium project, typically takes longer to process.

**2.2 COARSE AGGREGATE**

A. Hard durable aggregate carefully graded from coarse to fine in proportions required to match approved samples.

**2.3 AGGREGATE FOR BACK-UP MIX (FINE AND COARSE AGGREGATE LIGHTWEIGHT):**

A. ASTM C33. Limit gradation as required to produce the specified appearance and quality of concrete.

**2.4 PORTLAND CEMENT**

A. ASTM C150, Type I and Type II; Color as required.

**2.5 STRUCTURAL STEEL**

A. ASTM A36.

**2.6 STEEL FABRIC REINFORCEMENT**

A. ASTM A185, galvanized.

**2.7 STEEL WIRE REINFORCEMENT**

A. ASTM A82, cold drawn.

**2.8 REINFORCING STEEL**

A. ASTM A615, deformed, Grade 60.

**2.9 MISCELLANEOUS GALVANIZED AND/OR STAINLESS STEEL ITEMS**

- A. Bolts, nuts, washers, anchors, inserts, and the like for handling, erection, or use by other trades. All steel used in a permanent location or fashion shall be stainless, A304 or A316.

**2.10 NICHE COVER ATTACHMENT HARDWARE**

- A. United States Department of Military and Veterans Affairs, National Cemetery System, standard stainless steel rosette, mounting brackets, and bolts for complete attachment of the niche covers to the precast columbarium units are to be as shown on drawings:

1. Rosettes

- a. ASTM Type 316 stainless steel sheet goods, 2.7 mm (0.100 inch) thick.
- b. Die stamp, producing an eight-petal flower pattern as shown on drawings, 25 mm (one-inch) diameter with slight convex; center hole of 5.5 mm (0.218"), concentric to outer edge, with shoulder recess of 10 mm (0.400") in diameter and 1mm (0.035") in depth.
- c. Luster finish.

2. Interior mounting and attachment elements:

- a. ASTM Type 304 or 316 stainless steel tamper-resistant bolts, nuts, washers, anchors, mounting brackets, inserts and the like.

**2.11 BACK-UP MATERIAL**

- A. Closed cell neoprene, butyl, polyurethane, and vinyl or polyethylene foam rod, diameter approximately 1-1/3 to 1-1/2 times the joint width.

**2.12 BOND BREAKERS (IF USED)**

- A. Type and material recommended by sealant manufacturer.

**2.13 SEALING COMPOUND (IF USED)**

- A. Fed. Spec. TT-S-00230 C, Type II, Class A, or ASTM C 920-87, Type S, Grade NS, Class 25.

**2.14 FABRICATION**

- A. Precast concrete columbarium units shall NOT be: Fabricated, delivered or incorporated in the work until samples have been approved. Precast concrete shall comply with ACI 533.3R, except as modified herein.

1. Concrete for precast columbarium units shall have minimum compressive strength of 34.5 MPa (5,000 psi) at 28 days.
2. Provide additional steel reinforcing as required for casting, handling and erection loads.
3. Back-up Mix: Porosity, strength, weight and gradation of coarse aggregate shall be as required to produce specified characteristics.

4. Columbarium units shall be cast in steel forms designed to suit shape and finish required and to withstand high frequency vibration. Concrete shall be deposited in oiled forms. Form oil shall be non-staining type. Vibrations, where required, shall be continuous during process of casting to attain through compaction, complete embedment of reinforcement and to assure concrete of uniform and maximum density without segregation of mix and full thickness of precast element is attained.
  - a. Anchors, lifting devices, provisions for cutouts and openings, dovetail slots, notches, reglets, inserts and similar items required for the work of other trades shall be accurately positioned in forms before casting elements.
  - b. All fastener location holes, including those for anchoring of units and attachment of niche covers, shall be cast into units. Drilling to precast concrete columbarium units, after fabrication, shall not be acceptable.
5. Cement, aggregate and water shall be obtained from single sources for facing mix of precast concrete work in order to assure regularity of appearance and uniformity of color.
6. Finish: Exposed faces shall have smooth finish, unless otherwise noted. The face of the units shall be processed by the manufacturer, following removal from the forms to insure that the discoloration and blemishes on the niche faces are removed before shipping to the site.
  - a. Back side of single columbarium units are not exposed to view. They will have a CMU block veneer finish as indicated on the drawings.
7. Curing: Precast concrete shall be cured as required to develop specified structural characteristics and shall be stored in a manner that will permit all surfaces to cure equally and minimize warping, without staining the exposed faces.

#### **2.15 SEAL AND FINISH EXPOSED EDGES**

- A. Finish for all exposed faces and edges of columbarium units shall be coated with a non-yellowing, clear coat sealer suitable for cured concrete and porous masonry as an anti-graffiti coating, which has been used successfully on at least one columbarium project for a National Veteran Cemetery. Application on sample unit to be approved by Contracting Officer prior to application of coating throughout.

Manufacturer's literature shall be submitted as part of the submittal process as well as the listing of previous project(s).

- B. Anti-graffiti coating system. Furnish and install a permanent multi-coat anti-graffiti coating system, matte type finish (non-gloss), designed to be applied on porous concrete and brick surfaces and to provide a minimum life, as indicated in the manufacturer's literature, of 10 years. The coating system shall be clear, non-yellowing, and UV resistant.

- 1. Anti-graffiti coating shall be Rainguard VANDLSYSTEM 10 or approved equal.

### **PART 3 - EXECUTION**

#### **3.1 HANDLING AND INSTALLATION**

- A. Before beginning installation, inspect work of other trades in-so-far as it affects the work of this Section. Commencing installation of precast concrete columbarium units will be construed as acceptance, as suitable, of such work of other trades. Concrete base for the columbarium units shall be inspected and modified as required, grinding off high spots, to become an acceptable base upon which to install the units. Columbarium units shall be handled in a nearly vertical plane at all times and stacked vertically on wood supports of adequate strength, until erected. Cover and protect precast concrete columbarium units against staining and other damage. Reinstall, realign and otherwise correct improper installed units.
- B. Accurately place and securely anchor precast concrete columbarium units to adjoining construction in accordance with approved shop and erection drawings.

#### **3.2 SETTING**

- A. Where shown, joints shall be filled with sealant. Surfaces and other joints for precast concrete columbarium units shall be cleaned of all dust, dirt and other foreign matter. Exposed surfaces of units shall either be protected by anti-graffiti coating at the manufacturer, or shall be protected until accepted by the VA following installation. Units that have been damaged by graffiti on exposed surfaces, when not coated in advance shall be rejected and removed from the site.
- B. Each precast element shall be set level and true to line with uniform joints. Joints required to have sealants shall be kept free of dirt and other contaminants for their full depth. Precautions shall be taken to protect precast concrete work from being damaged and soiled during and

after installation. Wedges, spacers or other appliances which are likely to cause staining shall be removed from joints.

### **3.3 SEALING OF JOINTS**

- A. Where shown and/or wherever required to make the work watertight, joints between precast concrete columbarium units and between other precast elements and adjoining masonry, concrete and other materials shall be filled with back-up material for depth extending as required to form joint of depth as shown or recommended by sealant manufacturer. Provide bond breakers at base of sealant where space for back-up does not exist and to prevent sealant from bonding to material at base of joint.
- B. Workmanship shall be in accordance with Division 1 Specification Sections.

### **3.4 CLEANING**

- A. After erections are complete, clean precast columbarium units using materials, equipment and methods recommended by manufacturer.

### **3.5 REPLACEMENT AND REPAIR**

- A. Precast concrete columbarium units which are damaged, cracked, stained, improperly fabricated or otherwise defective shall be removed and be replaced. Precast units having minor defects not affecting serviceability or appearance may be repaired when approved by the RE/COR. Repaired work shall be sound, permanent, and flush with adjacent surfaces and of color and texture matching similar adjoining surfaces and shall show no line of demarcation between original and patched surfaces. Replacement and repairs shall be done at no additional cost to the Government.

### **3.6 FINISHING OF EXPOSED EDGES AND FACES**

- A. Apply seal coating to complete, cleaned exposed concrete edges as per manufacturer's standard specifications and recommendations.

### **3.7 INSTALLATION OF NICHE COVERS**

- A. Install niche covers plumb and level as shown so that exposed faces of niche covers lie in the same plane and that rows of niche covers align both horizontally and vertically. Tighten fasteners to achieve snug fit but do not over tighten to the point where they may crack or break niche covers. Due to the manufacturing tolerances in the niche covers and the allowable deviations from the nominal dimensions, it may be impossible to install all the niche covers perfectly. Coordinate the

installation procedures with the RE/COR and establish the critical  
visual line for which the best alignment is to be established.

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**SECTION 04 05 13  
MASONRY MORTARING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Section specifies mortar materials and mixes.
- B. Work in this Section is part of Alternate Deduct #2.

**1.2 RELATED WORK:**

- A. Mortar used in Section:
  - 1. Section 03 45 00, PRECAST ARCHITECTURAL CONCRETE.
  - 2. Section 04 05 31, MASONRY TUCK POINTING.
- B. Mortar Color: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 TESTING LABORATORY-CONTRACTOR RETAINED**

- A. Engage a commercial testing laboratory approved by Resident Engineer (RE) to perform the tests specified below.
- B. Submit information regarding testing laboratory's facilities and qualifications of technical personnel to Resident Engineer/COTR.

**1.4 TESTS**

- A. Test materials proposed for use for compliance with specifications in accordance with test methods contained in referenced specifications and as follows:
- B. Mortar:
  - 1. Test for compressive strength and water retention; ASTM C270.
  - 2. Mortar compressive strengths 28 days as follows:
    - Type M: Minimum 17230 kPa (2500 psi) at 28 days.
    - Type S: Minimum 12400 kPa (1800 psi) at 28 days.
    - Type N: Minimum 5170 kPa (750 psi) at 28 days.
- C. Cement:
  - 1. Test for water soluble alkali (nonstaining) when nonstaining cement is specified.
  - 2. Nonstaining cement shall contain not more than 0.03 percent water soluble alkali.
- D. Sand: Test for deleterious substances, organic impurities, soundness and grading.

**1.5 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Documentation on the make-up of existing mortar.

## C. Certificates:

1. Testing laboratory's facilities and qualifications of its technical personnel.
2. Indicating that following items meet specifications:
  - a. Portland cement.
  - b. Masonry cement.
  - c. Mortar cement.
  - d. Hydrated lime.
  - e. Fine aggregate (sand).
  - f. Color admixture.

## D. Laboratory Test Reports:

1. Mortar, each type.
2. Admixtures.

## E. Manufacturer's Literature and Data:

1. Cement, each kind.
2. Hydrated lime.
3. Admixtures.
4. Liquid acrylic resin.

**1.6 QUALITY ASSURANCE**

## A. Inspection of masonry:

1. Provide a mason(s) with demonstrated experience in historic masonry, ideally a minimum of three (3) years, and a working knowledge of the Secretary of the Interior's Standards Guidelines for the Treatment of Historic Properties shall be employed to inspect, identify areas in need of repair, and prepare treatment specifications for the LANC buildings.
2. Submit qualifications of proposed Mason for RE/COTR review and acceptance in a timely manner. Should RE/COTR not accept Mason's qualifications, Contractor shall submit another more qualified individual for review by RE/COTR with no additional cost and no additional time.

## B. Provide a mockup of restoration, repairs and cleaning to be approved by the Resident Engineer.

1. Location of mockup as directed by RE from locations requiring restoration, repair and cleaning.
2. Size: 80 sq. ft.
3. This approved panel shall establish the acceptable standard for remaining restoration, repair and cleaning of brickwork.



- C. Mason operating mechanical tools or power tools shall have demonstrated proficiency with the tools and expertise in their proper use on historic structures to the RE.

#### **1.7 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.
- B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

#### **1.8 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
- C40-04.....Organic Impurities in Fine Aggregates for  
Concrete
- C91-05.....Masonry Cement
- C109-07.....Compressive Strength of Hydraulic Cement Mortars  
(Using 2-in. or 50-MM Cube Specimens)
- C144-04.....Aggregate for Masonry Mortar
- C150-05.....Portland Cement
- C207-06.....Hydrated Lime for Masonry Purposes
- C270-07.....Mortar for Unit Masonry
- C595-08.....Blended Hydraulic Cement
- C780-07.....Preconstruction and Construction Evaluation of  
Mortars for Plain and Reinforced Unit Masonry
- C979-05.....Pigments for Integrally Colored Concrete
- C1329-05.....Mortar Cement

### **PART 2 - PRODUCTS**

#### **2.1 General**

- A. Resident Engineer will determine the exact locations requiring repair, working against the assumed quantities in the allowance. Determination will be made in the field shortly after Notice To Proceed is issued.
- B. Determine the type of existing mortar.
- C. Based on type of existing mortar, follow the appropriate requirements below that most closely matches the existing mortar.

## **2.2 HYDRATED LIME**

ASTM C207, Type S.

## **2.3 AGGREGATE FOR MASONRY MORTAR**

A. ASTM C144 and as follows:

1. Light colored sand for mortar for laying face brick.
2. White plastering sand meeting sieve analysis for mortar joints for pointing

B. Test sand for color value in accordance with ASTM C40. Sand producing color darker than specified standard is unacceptable.

## **2.4 BLENDED HYDRAULIC CEMENT**

ASTM C595, Type IS, IP.

## **2.5 MASONRY CEMENT**

A. ASTM C91. Type N, S, or M.

B. Use white masonry cement whenever white mortar is specified.

## **2.6 MORTAR CEMENT**

ASTM C1329, Type N, S or M.

## **2.7 PORTLAND CEMENT**

A. ASTM C150, Type I.

B. Use white Portland cement wherever white mortar is specified.

## **2.8 LIQUID ACRYLIC RESIN**

A formulation of acrylic polymers and modifiers in liquid form designed for use as an additive for mortar to improve physical properties.

## **2.9 WATER**

Water shall be potable, free of substances that are detrimental to mortar, masonry, and metal.

## **2.10 MASONRY MORTAR**

A. Conform to ASTM C270.

B. Admixtures:

1. Do not use mortar admixtures, except color admixtures if approved by Resident Engineer.
2. Submit laboratory test report showing effect of proposed admixture on strength, water retention, and water repellency of mortar.
3. Do not use antifreeze compounds.

C. Colored Mortar:

1. Maintain uniform mortar color for exposed work throughout.

2. Match mortar color in approved sample.
  3. Color of mortar for exposed work in alteration work to match color of existing mortar unless specified otherwise in section 09 06 00, SCHEDULE FOR FINISHES.
- D. Color Admixtures:
1. Proportion as specified by manufacturer.
  2. For color, see Section 09 06 00, SCHEDULE FOR FINISHES.

### **2.11 COLOR ADMIXTURE**

- A. Pigments: ASTM C979.
- B. Use mineral pigments only. Organic pigments are not acceptable.
- C. Pigments inert, stable to atmospheric conditions, nonfading, alkali resistant and water insoluble.

## **PART 3 - EXECUTION**

### **3.1 MIXING**

- A. Mix in a mechanically operated mortar mixer.
1. Mix mortar for at least three minutes but not more than five minutes.
- B. Measure ingredients by volume. Measure by the use of a container of known capacity.
- C. Mix water with dry ingredients in sufficient amount to provide a workable mixture which will adhere to vertical surfaces of masonry units.
- D. Mortar that has stiffened because of loss of water through evaporations:
1. Re-tempered by adding water to restore to proper consistency and workability.
  2. Discard mortar that has reached its initial set or has not been used within two hours.
- E. Pointing Mortar:
1. Mix dry ingredients with enough water to produce a damp mixture of workable consistency which will retain its shape when formed into a ball.
  2. Allow mortar to stand in dampened condition for one to 1-1/2 hours.
  3. Add water to bring mortar to a workable consistency prior to application.

### **3.2 MORTAR USE LOCATION**

- A. Use Type S mortar for masonry containing vertical reinforcing bars (non-engineered) unless existing mortar is different.

B. See Section 04 05 31 for tuck pointing mortar.

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**SECTION 04 05 16  
MASONRY GROUTING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

Section specifies grout materials and mixes.

**1.2 RELATED WORK:**

- A. Grout used in Section:
  - 1. Section 03 48 24, PRE-CAST CONCRETE COLUMBARIUM UNITS.
  - 2. Section 04 20 00, UNIT MASONRY.
  - 3. Section 04 43 00, NATURAL STONE.
- B. Grout Color: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 TESTS:**

- A. Test grout and materials specified.
- B. Certified test reports.
- C. Identify materials by type, brand name and manufacturer or by origin.
- D. Do not use materials until laboratory test reports are approved by Resident Engineer.
- E. After tests have been made and materials approved, do not change without additional test and approval of Resident Engineer.
- F. Testing:
  - 1. Test materials proposed for use for compliance with specifications in accordance with test methods contained in referenced specifications and as follows:
  - 2. Grout:
    - a. Test for compressive strength; ASTM C1019.
    - b. Grout compressive strength of 13790 kPa (2000 psi) at 28 days.
  - 3. Cement:
    - a. Test for water soluble alkali (nonstaining) when nonstaining cement is specified.
  - 4. Sand: Test for deleterious substances, organic impurities, soundness and grading.

**1.4 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Certificates:
  - 1. Indicating that following items meet specifications:
    - a. Portland cement.
    - b. Masonry cement.

- c. Grout.
  - d. Hydrated lime.
  - e. Fine aggregate (sand).
  - f. Color admixture.
- C. Laboratory Test Reports:
  - 1. Grout, each type.
  - 2. Admixtures.
- D. Manufacturer's Literature and Data:
  - 1. Cement, each kind.
  - 2. Hydrated lime.
  - 3. Admixtures.
  - 4. Liquid acrylic resin.

#### **1.5 PRODUCT DELIVERY, STORAGE AND HANDLING:**

- A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.
- B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

#### **1.6 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
  - C40-04 Organic Impurities in Fine Aggregates for Concrete
  - C91-05.....Masonry Cement
  - C150-07.....Portland Cement
  - C207-06.....Hydrated Lime for Masonry Purposes
  - C404-07.....Aggregate for Masonry Grout
  - C476-08.....Grout for Masonry
  - C595-08.....Blended Hydraulic Cement
  - C979-05.....Pigments for Integrally Colored Concrete
  - C1019-09.....Sampling and Testing Grout

### **PART 2 - PRODUCTS**

#### **2.1 HYDRATED LIME:**

ASTM C207, Type S.

#### **2.2 AGGREGATE FOR MASONRY GROUT:**

ASTM C404, Sieve size 8.

**2.3 BLENDED HYDRAULIC CEMENT:**

ASTM C595, Type IS, IP.

**2.4 MASONRY CEMENT:**

ASTM C91. Type N, S, or M.

**2.5 PORTLAND CEMENT:**

ASTM C150, Type I.

**2.6 LIQUID ACRYLIC RESIN:**

A formulation of acrylic polymers and modifiers in liquid form designed for use as an additive for mortar to improve physical properties.

**2.7 WATER:**

Potable, free of substances that are detrimental to grout, masonry, and metal.

**2.8 GROUT:**

A. Conform to ASTM C476 except as specified.

B. Grout type proportioned by volume as follows:

1. Fine Grout:

- a. Portland cement or blended hydraulic cement: one part.
- b. Hydrated lime: 0 to 1/10 part.
- c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.

2. Coarse Grout:

- a. Portland cement or blended hydraulic cement: one part.
- b. Hydrated lime: 0 to 1/10 part.
- c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.
- d. Coarse aggregate: one to two times sum of volumes of cement and lime used.

3. Sum of volumes of fine and coarse aggregates: Do not exceed four times sum of volumes of cement and lime used.

**2.9 COLOR ADMIXTURE (if required):**

A. Pigments: ASTM C979.

B. Use mineral pigments only. Organic pigments are not acceptable.

C. Pigments inert, stable to atmospheric conditions, nonfading, alkali resistant and water insoluble.

**PART 3 - EXECUTION**

**3.1 MIXING:**

- A. Mix in a mechanically operated grout mixer.
  - 1. Mix grout for at least five minutes.
- B. Measure ingredients by volume. Measure by the use of a container of known capacity.
- C. Mix water with grout dry ingredients in sufficient amount to bring grout mixture to a pouring consistency.

**3.2 GROUT USE LOCATIONS:**

- A. Use fine grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is 50 mm (2 inches) or less.
- B. Use either fine grout or coarse grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is greater than 50 mm (2 inches).
- C. Do not use grout for filling bond beam or lintel units.

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**SECTION 04 20 00  
UNIT MASONRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies requirements for construction of concrete masonry unit walls.

**1.2 RELATED WORK**

- A. Mortars and grouts: Section 04 05 13, MASONRY MORTARING, Section 04 05 16, MASONRY GROUTING.
- B. Steel lintels and shelf angles: Section 05 50 00, METAL FABRICATIONS.
- C. Sealants and sealant installation: Section 07 92 00, JOINT SEALANTS.
- D. Color and texture of masonry units: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Concrete masonry units, when exposed in finish work.
  - 2. Anchors, and ties, one each and joint reinforcing 305 mm (12 inches) long.
  - 3. Closed cell neoprene expansion joint filler for vertical placement in masonry walls.
- C. Shop Drawings:
  - 1. Special masonry shapes.
  - 2. Shop Drawings: Submit shop drawings for fabrication, bending, and placement of reinforcing bars. Comply with ACI 315.
- D. Certificates:
  - 1. Certificates signed by manufacturer, including name and address of contractor, project location, and the quantity, and date or dates of shipment of delivery to which certificate applies.
  - 2. Indicating that the following items meet specification requirements:
    - a. Solid and load-bearing concrete masonry units.
  - 3. Testing laboratories facilities and qualifications of its principals and key personnel to perform tests specified.
- E. Manufacturer's Literature and Data:
  - 1. Anchors, ties, and reinforcement.
  - 2. Shear keys.

3. Reinforcing bars.
4. Closed cell neoprene expansion joint material.
5. Closed cell backing rod for expansion joints.

#### **1.4 SAMPLE PANEL**

- A. Before starting masonry, lay up a sample panel in accordance with Masonry Standards Joint Committee (MSJC) and Brick Industry Association (BIA).
  1. Use masonry units from random cubes of units delivered on site.
  2. Include reinforcing, ties, and anchors.
- B. Use sample panels approved by Resident Engineer for standard of workmanship of new masonry work. At least one sample panel shall use the textured block designated as visible to the public.
- C. Use sample panel for expansion joint and mortar joint approval and to test cleaning methods. Use one-half of sample panel for test application of graffiti control emulsion and leave remaining half of panel untreated.
- D. Sample panel shall be a minimum of 1830mm x 1220mm (6' x 4')

#### **1.5 WARRANTY**

Warranty exterior masonry walls against moisture leaks and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be five years.

#### **1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
  - A615/A615M-09.....Deformed and Plain Billet-Steel Bars for  
Concrete Reinforcement.
  - A675/A675M-09.....Standard Specification for Steel Bars, Carbon,  
Hot-Wrought, Special Quality, Mechanical  
Properties.
  - A951-06.....Steel Wire for Masonry Joint Reinforcement.
  - C67-08.....Sampling and Testing Brick and Structural Clay  
Tile.
  - C90-08.....Load-Bearing Concrete Masonry Units.
  - C476-08.....Standard Specification for Grout for Masonry.
  - C744-08.....Prefaced Concrete and Calcium Silicate Masonry  
Units.

UNIT MASONRY

04 20 00- 2

F1667-05.....Fasteners: Nails, Spikes and Staples.

A276-10.....Standard Specification for Stainless Steel Bars and  
Shapes

C. Masonry Industry Council:

Hot and Cold Weather Masonry Construction Manual, 1999.

D. American Welding Society (AWS):

D1.4-05.....Structural Welding Code - Reinforcing Steel.

E. Masonry Standards Joint Committee; Specifications for Masonry Structures  
(ACI 530.1-08/ASCE 6-05/TMS 602-05) (MSJC).

F. American Concrete Institute (ACI)

ACI 315-99.....Details and Detailing of Concrete Reinforcement.

## **PART 2 - PRODUCTS**

### **2.1 CONCRETE MASONRY UNITS**

A. Hollow and Solid Non Load-Bearing Concrete Masonry Units: ASTM C90.

1. Concrete Masonry Unit Veneer

- a. Unit Weight: Medium weight
- b. Sizes: 10 cm x 10 cm x 40.64 cm (4"x4"x16")
- c. Color: Cool Gray
- d. Finish: Single Sided Split Face

B. Hollow and Solid Load-Bearing Concrete Masonry Units: ASTM C90.

1. Concrete Masonry Unit Retaining Wall Block

- a. Unit Weight: Medium weight
- b. Sizes: 20.32 cm x 20.32 cm x 40.64 cm (8"x8"x16")
- c. Color: Cool Gray
- d. Finish: Double Sided Split Face and Three Sided Split Face C.  
Corner and End Blocks

2. Concrete Masonry Unit Structural Block Standard

- a. Unit Weight: Medium weight
- b. Sizes: 20.32 cm x 20.32 cm x 40.64 cm (8"x8"x16")
- c. Color: Cool Gray
- d. Finish: Precision

### **2.2 REINFORCEMENT, ANCHORS AND TIES**

A. Steel Reinforcing Bars: ASTM A615M, deformed bars, grade as shown.

B. Joint Reinforcement:

- 1. Form from wire complying with ASTM A951 / ASTM A951M-06.
- 2. Galvanized after fabrication, ASTM A153 / ASTM A153M-B2
- 3. Width of joint reinforcement 25-30 mm (1-1 1/4 inches) less than  
nominal width of masonry wall or partition.

4. Cross wires welded to longitudinal wires.
5. Joint reinforcement at least 3000 mm (10 feet) in length.
6. Joint reinforcement in rolls is not acceptable.
7. Joint reinforcement that is crimped to form drip is not acceptable.
8. Maximum spacing of cross wires 400 mm (16 inch) to longitudinal wires.
9. Ladder Design:
  - a. Longitudinal wires deformed 4 mm (0.16 inch) diameter wire.
  - b. Cross wires 4 mm (0.16 inch) diameter.
10. Trussed Design:
  - a. Longitudinal and cross wires not less than 4 mm (0.16 inch nominal) diameter.
  - b. Longitudinal wires deformed.
- C. Adjustable Veneer Anchor for Frame Walls:
  1. Ties: Triangular tie, fabricated of 5 mm (0.20 inch) diameter galvanized cold drawn steel wire. Ties long enough to engage the anchor and be embedded not less than 50 mm (2 inches) into the bed joint of the masonry veneer.
  2. Angle Type:
    - a. Anchor: Minimum 2 mm (16 gauge) thick galvanized steel angle shaped anchor strap. Affix epoxy to vertical leg of strap for adhering to precast columbarium unit. Use USP structural connectors CIA-GEL 7000 or equal.
- D. Corrugated Wall Tie:
  1. Form from 1.5 mm (0.0598 inch) thick corrugated, galvanized steel 30 mm (1-1/4 inches) wide by lengths so as to extend at least 100 mm (4 inches) into joints of new masonry plus 38 mm (1-1/2 inch) turn-up.
  2. Provide 5 mm (3/16 inch) hole in turn-up for fastener attachment.

## **2.3 PREFORMED COMPRESSIBLE JOINT FILLER**

- A. Thickness and depth to fill the joint as specified.
- B. Closed Cell Neoprene: ASTM D1056, Type 2, Class A, Grade 1, B2F1.
- C. Non-Combustible Type: ASTM C612, Class 5, 1800 degrees F.

## **2.4 ACCESSORIES**

- A. Weep Hole Wicks: Glass fiber ropes, 10 mm (3/8 inch) minimum diameter, 300 mm (12 inches) long.
- B. Cavity Drain Material: Shall be a recycled polyester/polyethylene mesh trapezoidal shaped to maintain cavity air flow and drainage while suspending mortar droppings at unequal heights.
- C. Masonry Cleaner:

1. Detergent type cleaner selected for each type of masonry used.
  2. Acid cleaners are not acceptable.
  3. Use soapless type specially prepared for cleaning brick or concrete masonry as appropriate.
- D. Anti-Graffiti Coating
1. Permashield Premium 5650 over Permashield Base 6100, Permanent Graffiti Control, as Manufactured by Monopole Inc, Glendale, California, or approved equal.
    - a. Color and Finish: Clear Flat
    - b. Properties: Coatings shall not darken or discolor the treated surfaces and shall be non-toxic, compatible with all standard polymer type caulking and sealing materials, conforming to AQMD 1113, and certified by manufacturer as suitable over paint finish. Colors of opaque materials shall match adjoining colors as required, or shall be as selected from manufacturer's standard and custom colors.

### **PART 3 - EXECUTION**

#### **3.1 JOB CONDITIONS**

- A. Protection:
1. Cover tops of walls with nonstaining waterproof covering, when work is not in progress. Secure to prevent wind blow off.
  2. On new work protect base of wall from mud, dirt, mortar droppings, and other materials that will stain face, until final landscaping or other site work is completed.
- B. Cold Weather Protection:
1. Comply with MSJC and "Hot and Cold Weather Masonry Construction Manual".

#### **3.2 CONSTRUCTION TOLERANCES**

- A. Lay masonry units plumb, level and true to line within the tolerances as per MSJC requirements and as follows:
- B. Maximum variation from plumb:
1. In 3000 mm (10 feet) - 6 mm (1/4 inch).
  2. In 6000 mm (20 feet) - 10 mm (3/8 inch).
- C. Maximum variation from level:
1. In any bay or up to 6,000 mm (20 feet) - 6 mm (1/4 inch).
  2. In 12,000 mm (40 feet) or more - 13 mm (1/2 inch).
- D. Maximum variation from linear building lines:
1. In any bay or up to 6,000 mm (20 feet) - 13 mm (1/2 inch).

2. In 12,000 mm (40 feet) or more - 19 mm (3/4 inch).
- E. Maximum variation in cross-sectional dimensions of columns and thickness of walls from dimensions shown:
  1. Minus 6 mm (1/4 inch).
  2. Plus 6 mm (1/4 inch).
- F. Maximum variation in prepared opening dimensions:
  1. Accurate to minus 0 mm (0 inch).
  2. Plus 6 mm (1/4 inch).

### 3.3 INSTALLATION GENERAL

- A. Keep finish work free from mortar smears or spatters, and leave neat and clean.
- B. Anchor masonry as specified in Paragraph, ANCHORAGE.
- C. Wall Openings:
  1. Fill hollow metal frames built into masonry walls and partitions solid with mortar as laying of masonry progresses.
  2. If items are not available when walls are built, prepare openings for subsequent installation.
- D. Tooling Joints:
  1. Do not tool until mortar has stiffened enough to retain thumb print when thumb is pressed against mortar.
  2. Tool while mortar is soft enough to be compressed into joints and not raked out.
  3. Finish joints in exterior face masonry work with a jointing tool, and provide smooth, water-tight concave joint unless specified otherwise.
  4. Tool Exposed interior joints in finish work concave unless specified otherwise.
- E. Before connecting new masonry with previously laid, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.

### 3.4 REINFORCEMENT

- A. Joint Reinforcement:
  1. Use as joint reinforcement in cavity walls and single wythe concrete masonry unit walls.
- B. Steel Reinforcing Bars:
  1. Install in cells of hollow masonry units where required for vertical reinforcement and in bond beam units for lintels and bond beam horizontal reinforcement. Install in wall cavities of reinforced masonry walls where shown.

**3.5 CMU CONTROL JOINTS.**

- A. Provide CMU control (CJ) joints where shown on drawings.
- B. Keep joint free of mortar and other debris.
- C. Where joints occur in masonry walls.
  - 1. Install cross shaped shear keys in concrete masonry unit wythe with preformed, compressible joint filler on each side of shear key unless otherwise specified.
  - 2. Install filler, backer rod, and sealant on exposed faces.
- D. Use standard notched concrete masonry units (sash blocks) made in full and half-length units where shear keys are used to create a continuous vertical joint.
- E. Interrupt steel joint reinforcement at expansion and control joints unless otherwise shown.
- F. Fill opening in exposed face of expansion and control joints with sealant as specified in Section 079200, JOINT SEALANTS.

**3.6 CONCRETE MASONRY UNITS**

- A. Kind and Users:
  - 1. Provide special concrete masonry shapes as required, including bond beam units and corner units. Use solid concrete masonry units, where full units cannot be used, or where needed for anchorage of accessories, or grout the cells of hollow units as described in the following paragraph.
  - 2. Provide solid load-bearing concrete masonry units or grout the cell of hollow units, where structural members impose loads directly on concrete masonry, and where shown.
- B. Laying:
  - 1. Lay concrete masonry units with 10 mm (3/8 inch) joints, with a bond overlap of not less than 1/4 of the unit length.
  - 2. Do not wet concrete masonry units before laying.
  - 3. Bond external corners of partitions by overlapping alternate courses.
  - 4. Lay first course in a full mortar bed.
  - 5. Set anchorage items as work progress.
  - 6. Where ends of anchors, bolts, and other embedded items, project into voids of units, completely fill such voids with mortar or grout.
  - 7. Provide a 6 mm (1/4 inch) open joint for caulking between concrete work and abutting masonry partitions.
  - 8. Lay concrete masonry units with full face shell mortar beds and fill head joint beds for depth equivalent to face shell thickness.

9. Lay concrete masonry units so that cores of units, that are to be filled with grout, are vertically continuous with joints of cross webs of such cores completely filled with mortar.
10. Do not wedge the masonry against the steel reinforcing. Minimum 13 mm (1/2 inch) clear distance between reinforcing and masonry units.
11. Hold vertical steel reinforcement in place by centering clips, caging devices, tie wire, or other approved methods, vertically at spacings noted.
12. Grout cells of concrete masonry units, containing the reinforcing bars, solid as specified under grouting.

### **3.7 GROUTING**

#### **A. Preparation:**

1. Clean grout space of mortar droppings before placing grout.
2. Close cleanouts.

#### **B. Placing:**

1. Consolidate each lift of grout after free water has disappeared but before plasticity is lost.
2. Interruptions:
  - a. When grouting must be stopped for more than an hour, top off grout 40 mm (1-1/2 inch) below top of last masonry course.

### **3.8 PLACING REINFORCEMENT**

- A. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on the Contract Drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.
- B. Position reinforcement accurately at the spacing indicated. Support and secure vertical bars against displacement. Horizontal reinforcement may be placed as the masonry work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 25 mm (1 inch), whichever is greater.
- C. Splice reinforcement bars where shown; do not splice at other places unless accepted by the Resident Engineer. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.
- D. Provide not less than minimum lap as indicated on shop drawings, or if not indicated, as required by governing code.



- E. Embed metal ties in mortar joints as work progresses, with a minimum mortar cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations.
- F. Embed prefabricated horizontal joint reinforcement as the work progresses, with a minimum cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations. Lap joint reinforcement not less than 150 mm (6 inches) at ends. Use prefabricated "L" and "T" sections to provide continuity at corners and intersections. Cut and bend joint reinforcement as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
- G. Anchoring: Anchor reinforced masonry work to supporting structure as indicated.

### **3.9 CLEANING AND REPAIR**

- A. General:
  - 1. Clean exposed masonry surfaces on completion.
  - 2. Protect adjoining construction materials and landscaping during cleaning operations.
  - 3. Cut out defective exposed new joints to depth of approximately 19 mm (3/4 inch) and repoint.
  - 4. Remove mortar droppings and other foreign substances from wall surfaces.
- B. Concrete Masonry Units:
  - 1. Immediately following setting, brush exposed surfaces free of mortar or other foreign matter.
  - 2. Allow mud to dry before brushing.

### **3.10 ANTI-GRAFFITI COATING**

- 1. General: Do not start installation of coating if conditions are present that prevent or interfere with the correct preparation of surfaces or installation of coating system.
- 2. Preparation: Remove dust, dirt, oil, grease, other deleterious substances and stain, and efflorescence and laitance from surfaces. Repair cracks and holes over 1/16 inch size. Spot prime cracks and holes 1/16 inch size and smaller and prime all horizontal surfaces other than soffits with a heavy duty coating supplied by same coating manufacturer. Mask and protect adjoining surfaces and glass, unless coating is harmless and easily removed.
- 3. Application:

- a. Install the anti-graffiti coating to surfaces as indicated on drawings.
  - b. Spray Application: Install each coat by airless spray with nominal 20 psi nozzle pressure. Obtain complete coverage of each coat. Indicate areas that are coated when application is stopped for lunch or at the end of the day.
4. Application Rates: Apply a minimum of 3 coats or more as recommended by manufacturer published application instructions, in the quantity of coating and coverage rates per coat established by preliminary tests, except total quantity shall be not less than the rate recommended for the involved surface in manufacturer's technical data.

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**SECTION 04 43 00  
CUT STONE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies requirements for construction of cut stone elements. Cut stones shall be used for construction of the columbarium and memorial wall elements, and other work elements as indicated in the Contract drawings.

**1.2 RELATED WORK**

- A. Mortars and grouts: Section 04 05 13, MASONRY MORTARING, Section 04 05 16, MASONRY GROUTING.
- B. Steel lintels and shelf angles: Section 05 50 00, METAL FABRICATIONS.
- C. Flashing: Section 07 60 00, FLASHING AND SHEET METAL.
- D. Sealants and sealant installation: Section 07 92 00, JOINT SEALANTS.
- E. Color and texture of natural stone: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Samples:
1. Natural Stone: Minimum three (3) samples for each stone type specified. Sample size shall be 200 mm by 400 mm (8 inches by 16 inches,) showing full color range and texture of stone, bond, and proposed sealant joints and faux saw cut score joints. One sample is to be treated with water-based graffiti and water repellant, or in the case of dense or polished stone, a low VOC, water-based solution of potassium methyl silicate as a sealer.
  2. For granite cobble sets for the entrance, supply minimum two (2) full size cobbles.
  3. Anchors, and ties, one each and joint reinforcing 1200 mm (48 inches) long.
  4. Mortar and sealant: provide samples representing the specified color and texture.
- C. Certificates:
1. Certificates signed by manufacturer, including name and address of contractor, project location, and the quantity, and date or dates of shipment of delivery to which certificate applies.

2. Submit a letter of certification stating the material being furnished is the specified material and there are sufficient reserves available to supply the project and furnish replacements if needed.

D. Manufacturer's Literature and Data:

1. Anchors, ties, and reinforcement.
2. Reinforcing bars.
3. Water-based graffiti and water repellant for porous masonry.

E. Shop Drawings: Show fabrication and installation details for stone applications shown on drawings:

1. Include dimensions and profiles of stone units.
2. Show locations and details of joints.
3. Show locations and details of anchors.
4. Include elevations and details of graphics and carvings.
5. Include structural analysis data signed and sealed by the qualified professional engineer.

F. Quality Assurance/Control Submittals:

1. Sealant Compatibility Test Report: Submit test report from sealant manufacturer, in accordance with Division 07 Section "Joint Sealants" stating that sealants will not stain stone.
2. Submit welding certificates.
3. Material Test Reports: From a qualified independent testing agency, as follows:
  - a. Provide reports for each stone type.
  - b. For metal components.

#### **1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility for Stone Cladding System: Engage a qualified installer for stone cladding system to assume complete responsibility for design, fabrication, and installation of stone cladding system to comply with specified requirements.

1. Engineering Responsibility: Comprehensive engineering analysis of exterior stone cladding by a qualified professional engineer.

B. Qualifications:

1. Installer Qualifications: Engage experienced installer that has completed stone installation similar in material, design, and extent to that indicated for the project.

2. Fabricator Qualifications: Engage experienced fabricator that has completed stone fabrication similar in material, design, and extent to that indicated for the project.
3. Professional Engineer Qualifications: Engage a professional engineer licensed to practice in the jurisdiction where the project is located and experienced in providing services for stone cladding systems similar in material, design, and extent to that indicated for the project.
4. Independent Testing Qualifications: ASTM E 329.
- C. Pre-Installation Meeting: Convene a pre-installation meeting at the site at least one week prior to commencing work of this section. The purpose of the meeting shall be to review methods and sequence of all stone work, special details and conditions, standards of workmanship, testing and quality control requirements, and other topics related to the work of this section.

#### **1.5 SAMPLE PANEL**

- A. Before starting masonry, lay up a sample panel as specified
  1. Use stone units from random pallets of units delivered on site.
  2. Include reinforcing, ties, and anchors.
  3. Provide a 1.2m x 1.8m (4 feet x 5 feet) panel, reflect both cubic and veneer in same vertical plane alignment.
  4. Multiple panels may be required to adequately reflect the various stone conditions and adjacencies anticipated on the project site. Panels shall reflect these adjacency conditions.
- B. Use sample panels approved by RE/COTR for standard of workmanship of new natural stone work.
- C. Use sample panel to test jointing and cleaning methods. Also to test anti-graffiti coating and subsequent graffiti cleaning.

#### **1.6 WARRANTY**

- A. Warrant exterior masonry walls against moisture leaks and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be five years.
- B. Anti-graffiti coating system manufacturer shall furnish the Owner a written single source performance warranty that the anti-graffiti coating system will be free of defects related to workmanship or material deficiency for a five (5) year period from the date of final acceptance of the work.

1. All defective areas shall be retreated by the system manufacturer at no additional cost to the Owner.

#### 1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
  - A153/A153M-16.....Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - A951/A951M-16.....Steel Wire for Masonry Joint Reinforcement
  - A1064/A1064M-16b.....Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
  - C119-16.....Standard Terminology Relating to Dimension Stone
  - C568/C568M-15.....Standard Specifications for Limestone Dimension Stone
  - C615/C615M-11.....Standard Specification for Granite Dimension Stone
  - C1242-15a.....Standard Guide for Selection, Design, and Installation of Dimension Stone Anchoring Systems
  - C1353C1353M-15a..... Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser
  - C1515-14.....Standard Guide to Cleaning of Exterior Dimension Stone, Vertical and Horizontal Surfaces, New or Existing
  - C1528-15.....Standard Guide for Selection of Dimension Stone for Exterior Use
  - D1056-14.....Standard Specification for Flexible Cellular Materials - Sponge Expanded Rubber
  - D7089-06(2014).....Standard Practice for Determination of the Effectiveness of Anti-Graffiti Coating for Use on Concrete, Masonry, and Natural Stone Surfaces by Pressure Washing

- C. Masonry Industry Council: All Weather Masonry Construction Manual, 2000.
- D. Federal Specifications (FS):  
FF-S-107C-00.....Screws, Tapping and Drive
- E. International Masonry Industry All Weather Council (IMIAC):  
Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

## **1.8 MAINTENANCE**

- A. Provide maintenance information indicating recommended cleaning and maintenance of the installed work of this section.
  - 1. Provide product data from producers of cleaning and maintenance materials and include in the maintenance manual. The manual shall include information regarding cleaning methods, stain and graffiti removal methods and sealers.
  - 2. Comply with requirements specified in Division 01 Section, "Operation and Maintenance Data"

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE STONE PRODUCTS**

- A. Natural Stone: Meet ASTM C615. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
  - 1. Face Size: As indicated on drawings.
  - 2. Each color of stone shall come from a single quarry, with sufficient reserves to satisfy the requirements of the project. The supplier shall have the capabilities to cut and finish the stone without delaying the project.
  - 3. Stone Source Examination: Make quarried blocks available for examination by Resident Engineer/Contracting Officer's Representative (RE/COR) or Landscape Architect, if requested.
  - 4. Color Range, Finish, Manufacturer:
    - a. Stone A: Sierra White Granite; "Thermal" finish, manufactured by Cold Spring Granite, 17482 Granite West Road, Cold Spring, MN 56320.
    - b. Stone B: Sierra White Granite; "Polish" finish, manufactured by Cold Spring Granite, 17482 Granite West Road, Cold Spring, MN 56320.
    - c. Stone C: Sierra White Granite; "Diamond 8" finish, manufactured by Cold Spring Granite, 17482 Granite West Road, Cold Spring, MN 56320.

d. Stone D: Charcoal Black Granite; "Thermal" finish, manufactured by Cold Spring Granite, 17482 Granite West Road, Cold Spring, MN 56320.

e. Stone E: Cherokee White Marble; "Honed" finish, manufactured by Polycor Georgia Marble, P.O. Box 238, 200 Georgia Marble Lane, Tate, Georgia 30177.

## 2.2 REINFORCEMENT AND ANCHORAGES

A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from stainless steel unless specifically indicated otherwise.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but at least 16mm (5/8 inch) cover on outside face. Outer ends of wires are bent 90 degrees and extend 50 mm (2 inches) parallel to face of veneer.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 100 mm (4 inches).

1. Where withes do not align or are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 32 mm (1-1/4 inches).

2. Wire: Fabricate from 4.8 mm (3/16 inch) diameter, stainless steel wire. Stainless steel wire ties are required.

3. Acceptable Product: Heckman Building Products Inc.; No. 262.

D. Adjustable Masonry-Veneer Anchors

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 445 N (100 lbf) load in both tension and compression without deforming or developing play in excess of 1.3 mm (0.05 inch).

2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

a. Anchor Section: Stainless steel barrel section with flanged head with eye and stainless steel, self-drilling screw. Eye designed to receive wire tie and to serve as head for drilling fastener into framing. Barrel length to suit sheathing thickness, allowing screw to seat directly against framing with flanged head covering hole in sheathing.



- b. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 4.8 mm (0.188 inch) diameter, stainless steel wire.
- c. Acceptable Product: Heckmann Building Products, Inc.; No. 75 Pos-I-Tie.
- 3. Adhesive Anchors: Units consisting of stainless steel threaded anchor plugs and compatible threaded stainless steel anchor rods.
  - a. Acceptable Product: Hilti HIT-HY 200 and HIT-Z(-R) anchoring system and anchors.
- E. Anchor Material: Stainless steel, ASTM A 666, Type 304.
- F. Dowels and Pins Material: Stainless steel, ASTM A 276, Type 304.
- G. Aluminum Anchor Material: Extruded aluminum, ASTM B 221, not less than strength and durability properties of Alloy 6063-T6.
- H. Cast-in-Place Inserts Not In Contact with Stone: Stainless s adjustable inserts, with bolts, nuts, washers, and shims and as follows:
  - 1. Finish: Stainless steel material is required, not coated steel.
  - 2. Capacity: Sustain load equal to 4 times the required loads.
  - 3. Testing: ASTM E 488.
  - 4. Post installed Anchor Bolts: Provide the following for installation into concrete and masonry:
    - a. Expansion anchors.
    - b. Stainless Steel Bolts: ASTM F 593, Alloy Group 1 or 2.
    - c. Stainless Steel Nuts: ASTM F 594, Alloy Group 1 or 2.
  - 5. Anchor Material: ASTM A 666 or ASTM A 276, Type 304 or 316.
    - a. Capacity:
      - 1) Concrete: Sustain load equal to 4 times the required loads
      - 2) Masonry: Sustain load equal to 6 times the required loads
      - 3) Test: ASTM E 488.
- I. Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers.
  - 1. Stainless Steel Bolts: ASTM F 593, Alloy Group 1 or 2.
  - 2. Stainless Steel Nuts: ASTM F 594, Alloy Group 1 or 2.
  - 3. Threaded Fastener Anchor Material: ASTM A 666 or ASTM A 276, Type 304 or 316.
- J. Weld Plates for Installation in Concrete and Precast Concrete: Section 05 50 00 Metal Fabrications.

- K. Provide stainless steel anchors including bolt, nut, flat and lock washer. Bolt designed to be inserted into routed slot in back of stone.
  - 1. Provide Type 31 Anchors as manufactured by Cold Spring Granite Company.
  - 2. Diameter: Size anchors to comply with requirements, but not less than 3/16 inch.

### 2.3 ACCESSORIES

- A. Joint Sealant: Refer to Section 07 92 00.
- B. Nailing Strips: Western softwood, preservative treated, sized to masonry joints.
- C. Weep Holes: Leave-out of full head mortar joints.
- D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
  - 1. Strips, full-depth of cavity and 250 mm (10 inches) wide, with dovetail shaped notches 175 mm (7 inches) deep that prevent mesh from being clogged with mortar droppings.
- E. Mortar: Refer to Section 04 05 13.
- F. Expansion Joint Fillers: ASTM D1056 Class RE-11.
- G. Anti-graffiti Coating: Anti-graffiti coating shall meet the following requirements:
  - 1. Active Content: Organofluorosilane.
  - 2. Solvent: None, water-borne.
  - 3. VOC Content: Contractor shall verify that anti-graffiti coating is in VOC (volatile organic compound) compliance with the South Coast Air Quality Management District regulations, as well as all other federal, State and local regulations.
  - 4. Cleaning Cycles: ASTM D 6578 "Standard Practice for Determination of Graffiti Resistance" minimum 25 cycles without loss of repellency.
  - 5. Breathability: ASTM D 1653 greater than 95% water vapor transmission.
  - 6. Surface Appearance: Clear with no appreciable difference compared to non-coated surface.
  - 7. Excellent Ultraviolet light stability.
  - 8. Product must have independent laboratory analysis that material does not contain any known carcinogens.
  - 9. Packing and Shipping: Deliver products in original unopened packaging with legible manufacturer's identifications.
  - 10. Storage and Protection: Comply with manufacturer's recommendations.

**2.4 FABRICATION**

- A. Fabricate stone to comply with sizes, shapes, and tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.
- B. Cut, at manufacturing facility, stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.
- C. Carefully inspect stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.
  - 1. Clean sawed backs of stone to remove rust stains and iron particles.
- D. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups based upon the designated match existing conditions.

**2.5 ENGRAVING TO ACCEPT INLAYS**

- A. Engraving shall be as indicated, using the highest industry standards for preparation and completion of engraving to result in crisp engraving, of the style indicated to accept stainless steel inlay elements and as approved during the submittal review process.
- B. Included in the engraving shall be the procedures and materials to be used to clean the engraving before the stainless steel inlay is applied, to maximize the longevity on the inlay installation. Provide recommended materials and procedures from the manufacturer to maximize the longevity of the inlay installation, and follow the approved procedures.

**PART 3 - EXECUTION****3.1 PRE-INSTALLATION CONFERENCE**

- A. Convene a meeting on site, after submittals are received and approved but before any work, to: review drawings and specifications; submittals; schedule; manufacturer instructions; site logistics and pertinent matters of coordination; details, methodology, timing and responsibilities for construction of the mock-up(s); temporary protection, governing regulations, tests and inspections; participants to include RE/COR and all parties whose work is effected or related to the work of this section.

### 3.2 MOCK-UPS

- A. The Contractor shall create multiple mock-ups prior to the overall project construction demonstrating the characteristics, methods of construction, anchorage, color, texture, jointing, materials to sufficiently convey what the final products will be for the various site elements as described. Information on the requirements for the mock-ups will be indicated in the specifications and on the drawings. The general elements for which mock-ups will be required, specifically demonstrating the cut stone assemblies are as follows:
1. Entry Wall - See drawings for requirements for mock-up of lettering attachment.
  2. Columbarium Wall - Refer to the specifications for the precast columbarium wall units for additional details on the mock-ups.
  3. Memorial Wall - Refer to the specifications for the cast-in-place concrete memorial wall units for additional details on the mock-ups.

### 3.3 EXAMINATION

- A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine substrate to verify that dovetail slots, inserts, reinforcement, veneer anchors, flashing, and other items installed in substrates and required for or extending into stone masonry are correctly installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Determine the jointing method for securing the individual cut stone assemblies. Refer to the drawings for details on where and how the various cut stone assemblies are to be installed in the various project elements being constructed.
1. Full mortar bed, and mortar on sides of units.
  2. Setting on shims, secured to substrate
    - a. Stainless Steel Pins
    - b. Adhesive applied to grooves in the cut stone assemblies, and substrate to which it is attached.
  3. Backer rod and caulking at joint between the cut stone assembly and a concrete substrate, or adjoining material.
  4. Backer rod and caulking at joints between adjoining cut stone assemblies.

**3.4 PREPARATION**

- A. Coat concrete and unit masonry backup with asphalt damp proofing as indicated.
- B. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

**3.5 SETTING OF STONE MASONRY, GENERAL**

- A. Generally field cutting and trimming should not be required as stones are to be cut after field measurements and submittal approval. Field cutting shall only be allowed if approved in advance for specific stones or unusual conditions, and following an acceptable demonstration of the methods to be performed and acceptance of the resulting products.
  - 1. The use power saws to cut stone shall only be allowed as indicated above. Cut lines straight and true, with edges eased slightly to prevent snapping. Cut edges, if allowed shall be in accordance with the accepted established standards and samples.
- B. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances. Before setting, the existing surfaces of concrete or stone, or adjoining stones shall be protected from damage during the setting process
- C. Maintain uniform joint widths as indicated on the contract drawings within established construction tolerances. If construction tolerances are not indicated on the drawings, then the allowable tolerances shall be as established in the mock-up or as agreed to by the Resident Engineer after consultation with the A/E
- D. Provide sealant joints of widths and at locations indicated.
  - 1. Keep sealant joints free of mortar and other rigid materials.
  - 2. Sealing joints is specified in Section 07 92 00, JOINT SEALANTS."
- A. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated, including the special flashing beneath the joints on the wall caps as indicated.

1. Cut flexible flashing flush with face of wall after masonry wall construction is completed.
- F. Coat limestone with cementitious damp proofing as follows:
1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.
  2. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.
  3. Allow cementitious damp proofing formulations to cure before setting damp proofed stone. Do not damage or remove damp proofing in the course of handling and setting stone.
- G. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.
1. Use round plastic tubing, rectangular plastic tubing mesh or weep holes/vents to form weep holes.
  2. Space weep holes and/or vents, as indicated, 24 inches on center maximum.
  3. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.
  4. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article, 2.7.

### 3.6 COURSING

- A. Place masonry to lines and level indicated.
- B. Arrange and trim stones for adequate fit in a Pattern that matches the existing columbarium all at the location indicated, with course heights as indicated, random lengths, uniform joint widths with offset between vertical joints as indicated, as approved in the mock-up process.

### 3.7 PLACING AND BONDING

- A. Lay stone veneer in full bed of mortar (horizontal, vertical, and collar joints), properly jointed with other work. Buttering corners of joints and deep or excessive furrowing of mortar joints is not permitted.
- B. Fully bond intersections, and external and internal corners.
- C. Do not shift, or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- D. Remove excess mortar on surface and in cavities
- E. Placement shall match the existing as indicated, and shall be as approved in the mock-up(s).

**3.8 CONSTRUCTION TOLERANCES**

- A. Variation from Level: For horizontal exposed lines for the stone surfaces, do not exceed plus or minus 1/8 inch from the true level plane established by the design drawings, unless specific tolerances differing these exist elsewhere in the drawings or specifications, and have been accepted by the Resident Engineer following consultation with the design A/E.
- B. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.

**3.9 INSTALLATION OF ANCHORED STONE MASONRY**

- A. Anchor stone trim with stone trim anchors where indicated. Install anchors by fastening to substrate and inserting tabs and dowels into kerfs and holes in stone units. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.
- B. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.
- C. Provide 1-inch cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris and use and install rain screen and weeps as indicated as accepted in the mock-up.

**3.10 INSTALLATION OF ADHERED STONE MASONRY VENEER**

- A. Rake out joints for pointing with mortar to depth as accepted in the mock-up, before setting mortar has hardened. Rake joints to uniform depths to establish the finished appearance as accepted in the mock-up.

**3.11 POINTING**

- A. Pointing shall match the existing where indicated and as approved in the accepted mock-up(s).
- B. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.
- C. Point stone joints by placing and compacting pointing mortar in layers not more than 3/8 inch deep. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- D. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:

1. Joint Profile: As indicated and accepted on the mock-up.

### **3.12 CONTROL/EXPANSION JOINTS**

- A. Size control joints in accordance with Section 07 92 00 for sealant performance, but in no case larger than adjacent mortar joints.
- B. Provide expansion joints as indicated.

### **3.13 CUTTING AND FITTING**

- A. Cut and fit for identification inserts
- B. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.
- C. Cutting and fitting shall be demonstrated and accepted in the mock-up(s) as establishing the method and quality of acceptable workmanship and installation.

### **3.14 ENGRAVING TO ACCEPT INLAYS**

- A. Provide all labor, materials, manpower and equipment required to perform the engraving to accept stainless steel inlay elements for the indicated locations as approved during the submittal process, to result in high quality engraving meeting the contract documents, including the approved submittal documents.

### **3.15 MASONRY FLASHINGS**

- A. Extend flashings to exterior face of veneer, turn up a minimum of 200 mm (8 inches) and seal onto face of sheathing over stud framed back-up.
- B. Lap end joints minimum 150 mm (6 inches) and seal watertight per manufacturer's recommendation.
- C. Use flashing manufacturer's recommended adhesive and termination sealant.
- D. Create end dams at end of window heads, and other vertical elements to channel water to nearest weep hole away from windows and other items which might allow water to travel vertically.

### **3.16 LINTELS**

- A. Install loose steel lintels as scheduled or shown. Leave space at end of lintels to expand.

### **3.17 BUILT-IN WORK**

- A. As work progresses, build-in metal door frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates, and other items to be built in the work supplied by other Sections.
- B. Build-in items plumb and level.



C. Bed anchors of metal door and glazed frames in mortar joints. Fill frame voids solid with mortar. Fill masonry cores with grout minimum 300 mm (12 inches) from framed openings.

D. Do not build-in organic materials subject to deterioration.

**3.18 ANTI-GRAFFITI PROTECTION**

A. All stone surfaces exposed to view, including the aerial view (top) of columbarium caps, shall be treated. Anti-graffiti coating shall meet all product requirements and shall be appropriate for use on the material and finish to which it is to be applied. B. Project Conditions:

1. Compatibility: Verify compatibility with curing compounds, patching materials, repair mortar, paints, sealants, caulking, etc. to be used on masonry surfaces to receive anti-graffiti coating.
2. Environmental Requirements:
  - a. Maintain ambient temperature above 40 degrees F during and 24 hours after installation.
  - b. Do not proceed with application on materials if ice or frost is covering the substrate.
  - c. Do not proceed with application if ambient temperature of surface exceeds 100 degrees F.
  - d. Do not proceed with application of materials in rainy conditions or if heavy rain is anticipated within 4 hours after application.
- C. Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion. Do not proceed until unsatisfactory conditions have been corrected.
- D. Preparation:
  1. All adjacent sealants, patching materials, expansion joints, etc. shall have been installed and approved prior to commencing work on the installation of the anti-graffiti coating.
  2. Install coverings as necessary to protect adjacent surfaces.
  3. Surfaces to receive anti-graffiti coating shall be cleaned of dirt, oil, graffiti, grease, laitance and other contaminants. Remove dirt, dust and materials that will interfere with the proper and effective application of the anti-graffiti coating. It is the responsibility of the Contractor to prepare the surfaces to receive anti-graffiti coating as recommended by the coating manufacturer and acceptable to the RE/COR.
- E. Field Quality Control: Before commencing work, an anti-graffiti coating application will be field tested for acceptance at an appropriate location designated by the RE/COR. The field test application shall be a minimum of four (4) square feet in area.
- F. Application:
  1. Product shall be applied as per manufacturer's application instructions and recommendations for this specific project. Provide the RE/COR with a written copy of the manufacturer's recommendations.
  2. Apply at temperature and weather conditions recommended by the manufacturer or written in this specification.

3. Surface residue shall be brushed out thoroughly until they completely penetrate into the surface.
  4. Protect treated areas from rain and other surface water for a period of not less than four (4) hours after application.
  5. Provide adequate ventilation and follow all federal, State and local safety regulations.
- G. Cleaning: As Work progresses, clean spillage from adjacent surfaces using materials and methods as recommended by the anti-graffiti coating manufacturer. Remove protective coverings from adjacent surfaces when no longer needed.
- H. Work that does not conform to specified requirements shall be corrected and/or replaced as directed by the RE/COR at the Contractor's expense without extension of time.

### **3.19 ADJUSTING AND CLEANING**

- A. Remove and replace stone masonry of the following description:
1. Broken, chipped, stained, or otherwise damaged stone. Stone repair may be considered for very limited situations, if suitable and accepted repair methods are presented and accepted by the design A/E. and subsequently the RE/COR, following recommended by the A/E. The Contractor should include in his bid, the project work and materials that do not allow for the repair of damaged stones.
  2. Defective joints.
  3. Stone masonry not matching approved samples and mockups.
  4. Stone masonry not complying with other requirements indicated.
- B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain RE/COR's approval of sample cleaning before cleaning stone masonry.

3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution.

### **3.20 EXCESS MATERIALS AND WASTE**

- A. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
  1. Crush masonry waste to less than 4 inch in greatest dimension.
  2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 31 20 00, EARTH MOVING.
  3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
  4. Excess clean masonry materials may be allowed to be disposed of on site, only if the conditions and location are agreed to by the RE/COR.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off Owner's property.

- - - END - - -

**SECTION 04 72 00  
CAST STONE MASONRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies concrete building units for sign posts manufactured and installed to simulate natural cut stone. Cast Stone is made from fine and coarse aggregates, Portland cement, mineral oxide color pigments, chemical admixtures and water to simulate a natural stone.
- B. Unless specifically indicated otherwise, cast stone provided for this project is to be wet-cast type.

**1.2 RELATED WORK**

- A. Sign Post Setting Excavation, Material and Backfill: Section 31 20 00, EARTH MOVING.
- B. Concrete Bases for Posts: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- C. Signs: Section 10 14 00, EXTERIOR SIGNAGE.

**1.3 SUSTAINABILITY REQUIREMENTS**

- A. Materials in this section may contribute towards contract compliance with sustainability requirements.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Provide cast stone sample panel, minimum size 100 by 300 by 300 mm (4 by 12 by 12 inches), for each color and each finish.
  - 2. Show finish on two 100 mm (4 inch) edges and 300 by 300 mm (12 by 12 inch) surface.
- C. Shop Drawings:
  - 1. Cast stone showing exposed faces, profiles, cross sections, anchorage, reinforcing, jointing and sizes.
  - 2. Setting drawings with setting mark.
- D. Certificates: Test results indicating that the cast stone meets specification requirements and proof of plant certification; certification documents must be current within one year of preconstruction meeting.

- E. Submit manufacturers test results of cast stone previously made by manufacturer, indicating compliance with ASTM C1364.
- F. Laboratory Qualifications: Description of testing laboratories facilities and qualifications of its principals and key personnel.
- G. List of jobs furnished by the manufacturer, which were similar in scope and at least three (3) years of age.
- H. Installer Qualifications: Provide documentation of requirements specified herein.

#### **1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Store cast stone under waterproof covers on planking clear of ground.
- B. Protect from handling, dirt, stain, and water damage.
- C. Mark production units with the identification marks as shown on the shop drawings.
- D. Package units and protect them from staining or damage during shipping and storage.
- E. Provide packaging and lifting devices from the manufacturer that are designed to permit the installer easy removal for inspection, or to handle the cast stone for installation without causing damage to the units.
- F. Provide an itemized list of product to support the bill of lading.

#### **1.6 WARRANTY**

- A. Warranty exterior cast stone masonry sign posts against any defects and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period to be two years.

#### **1.7 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American Concrete Institute (ACI):
  - 318/318M-11                      Building Code Requirements for Structural Concrete and Commentary
- C. Architectural Precast Association; certification program.
- D. American Society for Testing and Materials (ASTM):
  - A167-99(2009)                      Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
  - A185/A185M-07                      Steel, Welded Wire Reinforcement, Plain, for Concrete

A240/A240M-13a	Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
A276-13	Stainless Steel Bars and Shapes
A615/A615M-12	Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
A666	Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
C33/C33M-13	Concrete Aggregates
C150/C150M-12	Portland Cement
C260/C260M-10a	Air-Entraining Admixtures for Concrete
C426-10	Linear Drying Shrinkage of Concrete Masonry Units
C494/C494M-13	Chemical Admixtures for Concrete
C503/C503M-10	Marble Dimension Stone
C568/C568M-10	Limestone Dimension Stone
C615/C615M-11	Granite Dimension Stone
C616/C616M-10	Quartz-Based Dimension Stone
C618-12a	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
C979/C979M-10	Pigments for Integrally Colored Concrete
C989/C989M-13	Slag Cement for Use in Concrete and Mortars
C1194-03(2011)	Compressive Strength of Architectural Cast Stone
C1195-03(2011)	Absorption of Architectural Cast Stone
C1364-10b	Architectural Cast Stone
D2244-11	Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

E. Cast Stone Institute Technical Manual and Cast Stone Institute standard specifications.

## 1.8 QUALITY ASSURANCE

### A. Manufacturer:

1. Must have five years minimum continuous operating experience, and have facilities for producing cast stone of the shapes, quantities and size required for this project.
2. Must be a producer certified by the Cast Stone Institute or the Architectural Precast Association.

3. Producer assumes responsibility for engineering units to comply with performance requirements and use indicated, including a comprehensive engineering analysis by a qualified professional engineer who is licensed in their place of practice and who is experienced in providing engineering services of the kind indicated.
4. Shop drawings to bear seal and signature of professional engineer responsible for the design and preparation.

B. Installer:

1. Must provide documentation demonstrating that they have a minimum of five years experience setting cast or natural building stone.
2. Provide written handling and installation procedures that will be followed for the installation of the work for cast stones lifted, moved, adjusted in any way, other than by hand. Describe procedure starting at the inspection of the products once delivered to the site, and continue through the final setting of the cast stone units with them being secured into place in the work. Include procedures with description of the equipment that will be used, as well as all protection procedures to be followed, to ensure that no exposed surfaces or edges of the cast stone are damaged during handling or installation.
3. Provide written procedures for removal and replacement of cast stone units that have been damaged on any edges or faces that will be visible in the final installation, including drip slots.
4. Provide procedures for inspection and identification of any exposed damage, with procedures for immediate marking of the units to be removed and replaced prior to grouting or sealing of joints.

C. Testing:

1. Follow the procedures in ASTM C1364.
2. One (1) sample from production units may be selected at random from the field for each 14 m<sup>3</sup> (500 cubic feet) delivered to the job:
  - a. Three (3) field cut cube specimens from each of these sample to have an average minimum compressive strength of not less than 85 percent with no single specimen testing less than 75 percent of design strength as specified.
  - b. Three (3) field cut cube specimens from each of these samples to have an average maximum cold-water absorption of 6 percent.
  - c. Test field specimens in accordance with ASTM C1194 and C1195.



- d. Manufacturer to submit a written list of projects similar and at least three (3) years of age, along with owner, architect and contractor references.
- D. Pre-Installation Conference: Convene a meeting on site, after submittals are received and approved but before any work, to review drawings and specifications, submittals, schedule, manufacturer instructions, site logistics and pertinent matters of coordination, temporary protection, governing regulations, tests and inspections; participants to include RE/COR and all parties whose work is effected or related to the work of this section.

#### **1.9 MANUFACTURING TOLERANCES**

- A. Cross section dimensions must not deviate by more than + 3 mm (1/8 in.) from approved dimension.
- B. Length of units must not deviate by more than length 3 mm (/360 or + 1/8 in.), whichever is greater, not to exceed 6 mm (+ 1/4 in.) Maximum length of any unit must not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.
- C. Warp bow or twist of units must not exceed length 3 mm (/360 or + 1/8 in.), whichever is greater.
- D. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features - On formed sides of unit, 3 mm (1/8 in.), on unformed sides of unit, 9 mm (3/8 in.) maximum deviation.

#### **1.10 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual conditions to receive cast stone components by field measurements before production.
- B. Dimensions on shop drawings to be based upon field measurements.

### **PART 2 - PRODUCTS**

#### **2.1 ARCHITECTURAL CAST STONE**

- A. Comply with ASTM C1364.
- B. Physical Properties: Provide the following:
  - 1. Compressive Strength - ASTM C1194: 45 Mpa (6,500 psi) minimum for products at 28 days.
  - 2. Absorption - ASTM C1195: 6 percent maximum by the cold water method, or 10 percent maximum by the boiling method for products as 28 days.
  - 3. Air Content for Wet Cast Product - ASTM C173 or C231: 4-8 percent for units exposed to freeze-thaw environments.
  - 4. Freeze Thaw - ASTM C1364: The cumulative percent weight loss (CPWL) less than 5 percent after 300 cycles of freezing and thawing.

5. Linear Shrinkage - ASTM C426: Maximum 0.065 percent.

C. Job Site Testing - One (1) sample from production units may be selected at random from the field for each 14m<sup>3</sup> (500 cubic feet) delivered to the job site:

1. Three (3) field cut cube specimens from each of these samples must have an average minimum compressive strength of not less than 85 percent with no single specimen testing less than 75 percent of design strength as allowed by ACI 318.

2. Three (3) field cut cube specimens from each of these samples must have an average maximum cold-water absorption of 6 percent.

3. Test field specimens in accordance with ASTM C1194 and C1195.

## **2.2 RAW MATERIALS**

A. Portland Cement: Type I or Type III, white and/or grey, ASTM C150.

B. Coarse Aggregates: Granite, quartz or limestone, ASTM C33, except for gradation, and are optional for the vibrant dry tamp (VDT) casting method.

C. Fine Aggregates: Manufactured or natural sands, ASTM C33, except for gradation.

D. Colors: Inorganic iron oxide pigments, ASTM C979 except that carbon black pigments cannot be used.

E. Admixtures: Comply with the following:

1. ASTM C260 for air-entraining admixtures.

2. ASTM C494/C495M Types A-G for water reducing, retarding, accelerating and high range admixtures.

3. Other Admixtures: Integral water repellents and other chemicals, for which no ASTM Standard exists, must be previously established as suitable for use in concrete by proven field performance or through laboratory testing.

a. Produce units with water repellent accepted by fabricator within mix design; product for mix design and setting mortar to be from same source.

4. ASTM C618; do not use mineral admixtures of dark and variable colors in surfaces intended to be exposed to view.

5. ASTM C989; granulated blast furnace slag may be used to improve physical properties, as verified by testing documentation.

F. Water: Potable.

G. Reinforcing Bars:

1. ASTM A615/A615M, Grade 40 or 60 steel galvanized or epoxy coated when cover is less than 37 mm (1.5 in.).
  2. Welded Wire Fabric: ASTM A185 where applicable for wet cast units.
- H. Provide anchors, dowels and other anchoring devices and shims that are standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel, brass, or stainless steel Type 302 or 304.

### **2.3 COLOR AND FINISH**

- A. Color to be similar to and complement the granite veneer utilized for columbarium construction. Color sample to be approved prior to manufacturing sign posts.
- B. Provide fine-grained texture similar to natural stone, for surfaces intended to be exposed to view. Air voids are not permitted in excess of 0.8 mm (1/32 in.), and the density of such voids must be less than 3 occurrences per any 25 mm<sup>2</sup> (1 in<sup>2</sup>). Air voids are not permitted when obvious under direct daylight illumination at a 1.5 m (5 ft.) distance.
- C. Units must exhibit a texture of no less quality than the approved sample when viewed under direct daylight illumination at a 3 m (10 ft.) distance.
- D. Units to comply with ASTM D2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.
1. Total color difference - not greater than 6 units.
  2. Total hue difference-not greater than 2 units.
- E. Chipping on edges or surfaces where they will be visible in the final installation, whether resulting from shipment, delivery or other factors or causes is not acceptable, and the units must be removed and replaced with new units.
- F. The occurrence of crazing or efflorescence may constitute a cause for rejection, at the sole discretion of the RE/COR.
- G. Remove cement film, if required, from exposed surface prior to packaging for shipment.

### **2.4 REINFORCING**

- A. Reinforce the units as required by the shop drawings, and prepared under direction of professional engineer, for safe handling and structural stress.
- B. Provide non-corrosive reinforcement where faces exposed to weather are covered with less than 38 mm (1.5 in.) of concrete material. Provide

reinforcement with minimum concrete coverage of twice the diameter of the bars.

## **2.5 EMBEDDED ANCHORS AND OTHER INSERTS**

- A. Fabricate from stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666, Type 304.

## **2.6 CURING**

- A. Cure units in a warm curing chamber 537.8 C (1000 F) at 95 percent relative humidity for approximately 12 hours, or cure in a 95 percent moist environment at a minimum 371.1 C (700 F) for 16 hours after casting. Provide additional yard curing at 95 percent relative humidity and 350-degree-days (i.e. 7 days at 260.0 C (500 F) or 5 days at 371.1 C (700 F) prior to shipping. Protect form-cured units from moisture evaporation with curing blankets or curing compounds after casting.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- A. Check cast stone materials for damage, coloration, finish, crazing, efflorescence, fit and finish prior to installation. Do not set unacceptable units.

## **3.2 SETTING TOLERANCES**

- A. Comply with the more stringent tolerances of the Cast Stone Institute<sup>SM</sup> Technical Manual or this section.
- B. Set stones 3 mm (1/8 in.) or less from plumb in all directions.

## **3.3 SETTING**

- A. Cast-in-place Setting:
  - 1. Drench units with clean water prior to setting.
  - 3. Set units and provide temporary bracing as needed to keep units plumb in all directions until cast-in-place footings have cured.
  - 4. Remove temporary bracing.

## **3.4 REPAIR AND CLEANING**

- A. Repair chips with touchup materials furnished by manufacturer.
- B. Saturate units to be cleaned prior to applying an approved masonry cleaner.
- C. Consult with manufacturer for appropriate cleaners.

## **3.5 INSPECTION AND ACCEPTANCE**

- A. Inspect finished installation according to Bulletin #36 published by the Cast Stone Institute except distance for measuring acceptability to be reduced to 1 m (3 ft.).

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**SECTION 04 73 01**  
**COLUMBARIUM NICHE COVERS - MARBLE**

**PART 1 - GENERAL**

**1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made part of this Section of the Specifications.

**1.2 DESCRIPTION**

- A. Work Included: Provide labor and materials necessary to complete the work of this Section, including but not limited to the following:
1. The Department of Veterans Affairs (VA) shall furnish niche covers for all of the new Columbarium Niches being installed by the Contractor. This specification section is for all work necessary for the Contractor to accept, handle, store, move and install one, government approved and provided, blank columbarium niche cover for each of the new precast niches created in the new columbarium walls. The government shall also provide, as part of the niche cover products manufactured for this project, a predetermined minimum number of approved blank niche covers to act as spares. The spare niche covers are to be used to replace niche covers should any damage occur, or for re-inscription necessitated by additional interment at a specific niche location.
  2. The number of approved government provided spare columbarium niche covers for this project to be accepted, offloaded and stored at the designated location is as determined by Memorial Program Services (MPS) in their contracting for the materials for this project. The total number of acceptable delivered niche covers for this project will be one for each new columbarium niche. Spare niche covers will also be provided by MPS and will be delivered to the project site. The actual number of spare covers will be as determined by MPS, but should be in the range of 5-15% of the total new niches for this project.

**1.3 INSTALLER QUALIFICATIONS**

- A. Installation of columbarium niche covers will be performed by those companies who, through an approved certification process, have demonstrated previous experience in installation of similar design as indicated in the drawings and specified herein.

**1.4 RELATED WORK**

- A. The following items are not included in this Section and will be performed under the designated Sections:

1. Section 03 48 24: PRECAST CONCRETE COLUMBARIUM UNITS, the precast concrete niche units with: niche cover mounting hardware assemblies (installed); and niche cover attachment hardware assemblies (provided for use to attach the Government provided niche covers). Four each of the niche cover mounting hardware assemblies shall be furnished and installed for each precast concrete niche opening. Four each of the niche cover attachment hardware assemblies shall be provided for each precast niche opening, to be used to mount the approved government niche covers as indicated and on the drawings.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 NICHE COVERS (GOVERNMENT PROVIDED) - CONTRACTOR ACCEPTANCE**

- A. Niche covers that have been inspected and accepted as being in compliance with manufacturing tolerances for size, hole size and placement, perpendicularity, finish, and product stone quality shall be furnished by the Government and delivered to the site on pallets. They shall be of size, type, manufacturing, finish and quantities required for this project. The covers shall be delivered to the site Freight on Board (FOB) and the Contractor shall be responsible to offload and secure them at the job site. The general quantity and condition shall be observed and an adequate count to cover all the installed columbarium units, plus required spares shall be verified by the Contractor prior to accepting the units and performing the offloading operations. Note any shipping damage and reject any damaged covers before the delivery truck leaves the site. Once satisfied, take ownership of the acceptable covers, as all being approved as meeting the government specifications and being suitable for installation at this project. Once the niche covers are accepted at the site, they shall become the Contractors responsibility until installed and the installation is accepted by the Resident Engineer/Contracting Officer's Representative (RE/COR).

**3.2 INSPECTION**

- A. All materials shall be inspected prior to installation to insure compliance with the contract documents and to insure there is no damage. Should conditions be different from those indicated on the contract documents, contractor should immediately notify the RE/COR.

**3.3 NICHE COVER ATTACHMENT HARDWARE**

- A. Each of the four niche cover attachment hardware assemblies provided, for each new precast concrete niche opening, as part of Section 03 48 24,

PRECAST CONCRETE COLUMBARIUM UNITS, consists of: the stainless steel rosette, stainless steel tamperproof screw and the white or clear washer beneath the rosette, that is to bear against the niche cover when rosette is snugged up causing the cover to stay in place against the face of the niche opening due to friction. All of the niche cover hardware (mounting and attachment assemblies) shall be as submitted and approved as part of the work in Section 03 48 24, PRECAST CONCRETE COLUMBARIUM UNITS.

- B. The Contractor performing the installation of the niche covers shall maintain control of the niche cover attachment hardware assemblies from delivery to the site through acceptance of the installation of the government provided niche covers.

### **3.4 INSTALLATION**

- A. Installation of the government provided niche covers shall include all materials, manpower, tools and equipment required to receive the approved government provided niche covers from the manufacturer, and handle them as necessary and perform whatever work is needed to result in the successful installation of one niche cover for every precast concrete niche space created for this project.
- B. The niche covers shall be installed so as to create a visual straight line along the top of the row of covers agreed to by the Resident Engineer as the primary visual vertical reference line in the installation. The covers shall be spaced achieve, as close as possible, the intended design spacing, taking into consideration the allowable fluctuations in the manufacturing tolerances for the government provided niche covers.
- C. The niche cover attachment assemblies shall be installed so that the threaded end of the tamperproof screw is inserted into the threads of the spring clip on the mounted angle bracket behind each of the mounting holes in the niche covers. This should result in the head of the screw being parallel with the face of the niche cover. The threaded hole in the spring clip shall be fully visible when looking through the mounting hole in the niche cover to the respective spring clip behind the hole. The position of the spring clip shall be adjusted so the threaded tamperproof screw will enter the threaded hole in the spring clip and that the attachment assembly can be tightened to secure the cover in the intended position. To achieve this installation, the angle brackets shall be adjusted to be the correct height from the niche wall so the hole in the spring clip can have the respective tamper proof screw inserted and tightened. To achieve the proper positioning of the spring clips, the

angle brackets shall be adjusted in their position, or the hole in the angle bracket through which the tamper proof screw passes when tightened into the spring clip, shall be enlarged as necessary to allow the adjustment of the spring clip to align with the hole in the niche cover so the tamper proof screws through the individual rosettes can each be inserted and tightened using the threaded spring clip. Only correct installations of the tamperproof screws, inserted into the threads of the spring clip and being tightened are acceptable. The head of the tamperproof screw shall be snugged up tight against the rosette, and shall be seated against the rosette, which occurs when the tamperproof screw is approximately perpendicular to the face of the niche cover.

### **3.5 CLEANING AND PROTECTION**

- A. Columbarium niche covers shall be shop cleaned at the time of fabrication. After installation, carefully clean the markers, removing all dirt stains, and all other incident defacements.
  - 1. Stiff bristle fiber brushes may be used, but the use of wire brushes or acid-type cleaning agents and other solutions which may cause discoloration is expressly prohibited. Fabricator should be contacted regarding the use of any cleaners and must approve of them before use.
  - 2. Protection of Finished Work: All covers that are installed as part of the work in progress shall be protected at all times during construction by use of a suitable strong, impervious film or fabric securely held in place.

### **3.4 CLEAN UP**

- A. Clean visible portions of all covers. Clean up area of excess material and debris and remove from site.

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**SECTION 04 73 10**  
**MEMORIAL MARKER-MARBLE**

**PART 1 - GENERAL**

**1.1 GENERAL PROVISIONS**

Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made part of this Section.

**1.2 DESCRIPTION**

- A. Work Included: Provide labor and materials necessary to complete the work of this Section, including but not limited to the following:
1. The Department of Veterans Affairs (VA) shall furnish memorial wall markers for installation in the memorial wall(s) to be constructed by the Contractor. This specification section provides all work necessary for the Contractor to accept, handle, store, move and install one approved blank memorial wall marker for each of the memorial wall marker sites in the new memorial wall(s).
  2. The number of approved government provided spare memorial markers for this project to be accepted, offloaded and stored at the designated location is as determined by Memorial Program Services (MPS) in their contracting for the materials for this project. The total number of acceptable delivered memorial markers for this project will be one for each new memorial marker location. Spare memorial markers will also be provided by MPS and will be delivered to the project site. The actual number of spare markers will be as determined by MPS, but should be in the range of 5-10% of the total new memorial marker sites for this project

**1.3 INSTALLER QUALIFICATIONS**

- A. Installation of memorial wall markers will be performed by those companies who, through an approved certification process, have demonstrated previous experience in installation of similar design as indicated in the drawings and specified herein.

**1.4 RELATED WORK**

- A. The following items are not included in this Section and will be performed under the designated Sections:
1. Section 04 43 00: CUT STONE, the memorial wall panels with: memorial wall marker mounting hardware assemblies (installed); and memorial wall marker attachment hardware assemblies (provided for use to attach the Government provided memorial markers). The memorial marker mounting hardware assemblies shall be furnished and installed at the corners of the memorial markers, whether they adjoin other

markers or adjacent cut stone installation. Refer to the drawings for specific details. A memorial wall marker attachment hardware assembly will secure the corner of each approved government provided memorial wall marker, as shown on the drawings.

#### **1.5 SUSTAINABILITY REQUIREMENTS**

- A. Materials in this section may contribute towards contract compliance with sustainability requirements.
- B. Biobased Material: For products designated by the USDA's BioPreferred® program, provide products that meet or exceed USDA recommendations for biobased content, subject to the products compliance with performance requirements in this Section. For more information regarding the product categories covered by the BioPreferred® program, please visit <http://www.biopreferred.gov/>.

#### **PART 2 - PRODUCTS (NOT USED)**

#### **PART 3 - EXECUTION**

##### **3.1 MEMORIAL WALL MARKERS (GOVERNMENT PROVIDED) - CONTRACTOR ACCEPTANCE**

- A. Memorial wall markers that have been inspected and accepted as being in compliance with manufacturing tolerances for size, perpendicularity, finish, and product stone quality shall be furnished by the Government and delivered to the site on pallets. They shall be of size, type, manufacturing, finish and quantities required for this project. The markers shall be delivered to the site Freight on Board (FOB) and the Contractor shall be responsible to offload and secure them at the job site. The general quantity and condition shall be observed and an adequate count to cover all the intended memorial wall marker locations, plus required spares, shall be verified by the Contractor prior to accepting the units and performing the offloading operations. The Contractor shall note any shipping damage and reject any damaged markers before the delivery truck leaves the site. Once satisfied, the Contractor shall take ownership of the acceptable markers, as all being approved as meeting the government specifications and being suitable for installation at this project. Once the memorial markers are accepted at the site, they shall become the Contractors responsibility until installed and the installation is accepted by the Resident Engineer/Contracting Officer's Representative (RE/COR).

##### **3.2 INSPECTION**

- A. All materials shall be inspected prior to installation to insure compliance with the contract documents and to insure there is no damage. Should conditions be different from those indicated on the contract documents, contractor should immediately notify the RE/COR.

### **3.3 MEMORIAL WALL MARKER ATTACHMENT HARDWARE**

- A. Hardware for attachment shall be specifically designed for attaching markers that will be engraved. The hardware is designed to be recessed or totally hidden, except for the rosettes at the corners of the markers and the hardware visible through the cracks between the individual markers, or cut stone edge. The hardware allows for the removal of an individual marker for engraving, without having to remove multiple markers. The material for the attachment hardware shall be verified to be compatible with stainless steel rosettes and rosette attachment screws, without adverse reactions during the submittal process. The hardware provided shall not cause staining on the markers. The marker attachment hardware shall only be visible when looking in the cracks between or adjoining the markers, and shall be installed being recessed from the face of the markers. The marker attachment hardware shall be suitable for the project installation using cut stone memorial wall installation(s). The shop drawing and submittal process, shall be used to indicate that the installation of the memorial wall markers is in compliance with design and installation as indicated in the drawings. The submittal, shop drawings and narrative of the work to be performed and coordinated shall clearly indicate how the work is to be coordinated, from the installation of the memorial wall concrete core to the completed installation of the memorial wall markers in the finished memorial wall(s). The attachment hardware shall be suitable for a permanent installation, out of doors, be suitable for the indicated loads, and shall produce the finish installation as indicated on the contract drawings.
- B. The Contractor performing the installation of the memorial wall markers shall maintain control of the memorial wall marker attachment hardware assemblies from delivery to the site through acceptance of the installation of the government provided memorial wall markers.

### **3.4 INSTALLATION**

- A. Installation of the government provided memorial wall markers shall include all materials, manpower, tools and equipment required to receive the approved government provided memorial wall markers from the manufacturer, and handle them as necessary and perform whatever work is needed to result in the successful installation of one memorial marker for every marker location in the memorial wall(s), as indicated on the drawings.
- B. The installation shall be such that the joints are straight, even width or height, and the face of the markers shall all be in the same plane as

the face of wall with a maximum allowable deviation from the plane of 1 mm (1/32").

- C. The installation of the memorial wall markers shall be coordinated with the work of constructing and finishing the memorial wall as designed so the end result is a complete and accepted memorial wall installation with the government provided memorial wall markers installed as indicated in the drawings, details, notes and specifications.

### **3.5 CLEANING AND PROTECTION**

- A. Memorial wall markers shall be shop cleaned at the time of fabrication. After installation, carefully clean the markers, removing all dirt stains, and all other incident defacements.
1. Stiff bristle fiber brushes may be used, but the use of wire brushes or acid-type cleaning agents and other solutions which may cause discoloration is expressly prohibited. Fabricator should be contacted regarding the use of any cleaners and must approve of them before use.
  2. Protection of Finished Work: All markers that are installed as part of the work in progress shall be protected at all times during construction by use of a suitable strong, impervious film or fabric securely held in place.
- B. Clean up area of excess material and debris.

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**SECTION 05 12 00  
STRUCTURAL STEEL FRAMING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies structural steel shown and classified by Section 2, Code of Standard Practice for Steel Buildings and Bridges.

**1.2 RELATED WORK**

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Painting: Section 09 91 00, PAINTING.
- C. Steel Decking: Section 05 31 00, STEEL DECKING.
- D. Composite Steel Deck: Section 05 36 00, COMPOSITE METAL DECKING.
- E. Fireproofing: Section 07 81 00, APPLIED FIREPROOFING.

**1.3 QUALITY ASSURANCE**

- A. Fabricator and erector shall maintain a program of quality assurance in conformance with Section 8, Code of Standard Practice for Steel Buildings and Bridges. Work shall be fabricated in an AISC certified fabrication plant.
- B. Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the written notification required by 29 CFR 1926.752. Provide copy of this notification to the RE/COTR.

**1.4 TOLERANCES**

Fabrication tolerances for structural steel shall be held within limits established by ASTM A6, by Section 7, Code of Standard Practice for Buildings and Bridges, and by Standard Mill Practice - General Information (AISC LRFD Manual, Second Edition, Page 1-183), except as follows:

- 1. Elevation tolerance for column splice points at time member is erected is 10 mm (3/8 inch).
- 2. Elevation tolerance for top surface of steel beams and girders at connections to columns at time floor is erected is 13 mm (1/2 inch).
- 3. Elevation tolerance for closure plates at the building perimeter and at slab openings prior to concrete placement is 6 mm (1/4 inch).

**1.5 DESIGN**

- A. Connections: Design and detail all connections for each member size, steel grade and connection type to resist the loads and reactions indicated on the drawings or specified herein. Use details consistent with the details shown on the Drawings, supplementing where necessary. The details shown on the Drawings are conceptual and do not indicate the required weld sizes or number of bolts unless specifically noted. Use rational engineering design and standard practice in detailing, accounting for all loads and eccentricities in both the connection and the members. Promptly notify the RE/COTR of any location where the connection design criteria is not clearly indicated. The design of all connections is subject to the review and acceptance of the RE/COTR. Submit structural calculations prepared and sealed by a qualified engineer registered in the state where the project is located. Submit calculations for review before preparation of detail drawings.

**1.6 REGULATORY REQUIREMENTS**

- A. AISC: Specification for Structural Steel Buildings - LRFD Specification for Structural Steel Buildings.
- B. AISC: Code of Standard Practice for Steel Buildings and Bridges.

**1.7 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop and Erection Drawings: Complete
- C. Certificates:
1. Structural steel.
  2. Steel for all connections.
  3. Welding materials.
  4. Shop coat primer paint.
- D. Test Reports:
1. Welders' qualifying tests.
- E. Design Calculations and Drawings:
1. Connection calculations, if required.
- F. Record Surveys.

**1.8 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Institute of Steel Construction (AISC):

1. Load and Resistance Factor Design Specification for Structural Steel Buildings (March 9, 2005)
  2. Code of Standard Practice for Steel Buildings and Bridges (March 2000).
- C. American National Standards Institute (ANSI):
- B18.22.1-03.....Plain Washers
  - B18.22M-05.....Metric Plain Washers
- D. American Society for Testing and Materials (ASTM):
- A6/A6M-08a.....Standard Specification for General Requirements  
for Rolled Structural Steel Bars, Plates,  
Shapes, and Sheet Piling
  - A36/A36M-08.....Standard Specification for Carbon Structural  
Steel
  - A53/A53M-07.....Standard Specification for Pipe, Steel, Black  
and Hot-Dipped, Zinc-Coated Welded and Seamless
  - A123/A123M-08.....Standard Specification for Zinc (Hot-Dip  
Galvanized) Coatings on Iron and Steel Products
  - A242/A242M-04e1.....Standard Specification for High-Strength Low-  
Alloy Structural Steel
  - A283/A283M-07.....Standard Specification for Low and Intermediate  
Tensile Strength Carbon Steel Plates
  - A307-07b.....Standard Specification for Carbon Steel Bolts  
and Studs, 60,000 psi Tensile Strength
  - A325-07a.....Standard Specification for Structural Bolts,  
Steel, Heat Treated, 120/105 ksi Minimum Tensile  
Strength
  - A490-08a.....Standard Specification for Heat-Treated Steel  
Structural Bolts 150 ksi Minimum Tensile  
Strength
  - A500-07.....Standard Specification for Cold Formed Welded  
and Seamless Carbon Steel Structural Tubing in  
Rounds and Shapes
  - A501-07.....Standard Specification for Hot-Formed Welded and  
Seamless Carbon Steel Structural Tubing
  - A572/A572M-07.....Standard Specification for High-Strength  
Low-Alloy Columbium-Vanadium Structural Steel
  - A992/A992M-06a.....Standard Specification for Structural Steel  
Shapes
- E. American Welding Society (AWS):

- D1.1-08.....Structural Welding Code-Steel
- F. Research Council on Structural Connections (RCSC) of The Engineering Foundation:  
Specification for Structural Joints Using ASTM A325 or A490 Bolts (2000)
- G. Military Specifications (Mil. Spec.):  
MIL-P-21035.....Paint, High Zinc Dust Content, Galvanizing,  
Repair (2003)
- H. Occupational Safety and Health Administration (OSHA):  
29 CFR Part 1926-2006...Safety Standards for Steel Erection

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Structural Steel: ASTM A36.
- B. Structural Tubing: ASTM A500, Grade B.
- C. Structural Tubing: ASTM A501.
- D. Steel Pipe: ASTM A53, Grade B.
- E. Bolts, Nuts and Washers:  
1. High-strength bolts, including nuts and washers: ASTM A325.  
2. Bolts and nuts, other than high-strength: ASTM A307, Grade A.  
3. Plain washers, other than those in contact with high-strength bolt heads and nuts: ANSI Standard B18.22.1.
- F. Zinc Coating: ASTM A123.
- G. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035.

## **PART 3 - EXECUTION**

### **3.1 CONNECTIONS (SHOP AND FIELD)**

- A. Welding: Welding in accordance with AWS D1.1. Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.1 to perform type of work required.
- B. High-Strength Bolts: High-strength bolts tightened to a bolt tension not less than proof load given in Specification for Structural Joints Using ASTM A325 or A490 Bolts. Tightening done with properly calibrated wrenches, by turn-of-nut method or by use of direct tension indicators (bolts or washers). Tighten bolts in connections identified as slip-critical using Direct Tension Indicators or the turn-of-the-nut method. Twist-off torque bolts are not an acceptable alternate fastener for slip critical connections.



### **3.2 FABRICATION**

Fabrication in accordance with Chapter M, Specification for Steel Buildings - Load and Resistance Factor Design.

### **3.3 SHOP PAINTING**

- A. General: Shop paint steel with primer in accordance with Section 6, Code of Standard Practice for Steel Buildings and Bridges.
- B. Shop paint for steel surfaces is specified in Section 09 91 00, PAINTING.
- C. Do not apply paint to following:
  - 1. Surfaces within 50 mm (2 inches) of joints to be welded in field.
  - 2. Surfaces which will be encased in concrete.
  - 3. Surfaces which will receive sprayed on fireproofing.
  - 4. Top flange of members which will have shear connector studs applied.
- D. Zinc Coated (Hot Dip Galvanized) per ASTM A123 (after fabrication):  
Touch-up after erection: Clean and wire brush any abraded and other spots worn through zinc coating, including threaded portions of bolts and welds and touch-up with galvanizing repair paint.

### **3.4 ERECTION**

- A. General: Erection in accordance with Section 7, Code of Standard Practice for Steel Buildings and Bridges.
- B. Temporary Supports: Temporary support of structural steel frames during erection in accordance with Section 7, Code of Standard Practice for Steel Buildings and Bridges.

### **3.5 FIELD PAINTING**

- A. After erection, touch-up steel surfaces specified to be shop painted. After welding is completed, clean and prime areas not painted due to field welding.
- B. Finish painting of steel surfaces is specified in Section 09 91 00, PAINTING.

### **3.6 SURVEY**

Upon completion of finish bolting or welding on any part of the work, and prior to start of work by other trades that may be supported, attached, or applied to the structural steel work, submit a certified report of survey to RE/COTR for approval. Reports shall be prepared by Registered Land Surveyor or Registered Civil Engineer as specified in Section 01 00 00, GENERAL REQUIREMENTS. Report shall specify that

location of structural steel is acceptable for plumbness, level and alignment within specified tolerances specified in the AISC Manual.

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**SECTION 05 31 00  
STEEL DECKING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies material and services required for installation of steel decking as shown and specified.

**1.2 RELATED WORK**

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Finish Painting: Section 09 91 00, PAINTING.

**1.3 DESIGN REQUIREMENTS**

- A. Design steel decking in accordance with AISI publication, "Specification for the Design of Cold-formed Steel Structural Members" except as otherwise shown or specified.
- B. Design all elements with the latest published version of applicable codes.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Shop and erection drawings showing decking unit layout, connections to supporting members, and similar information necessary for completing installation as shown and specified, including supplementary framing, sump pans, ridge and valley plates, cant strips, cut openings, special jointing or other accessories. Show welding, side lap, closure, deck reinforcing and closure reinforcing details. Show openings required for work of other trades, including openings not shown on structural drawings. Indicate where temporary shoring is required to satisfy design criteria.
- C. Manufacturer's Literature and Data: Showing steel decking section properties and specifying structural characteristics.
- D. Certification: For each type and gauge of metal deck supporting concrete slab or fill, furnish certification of the specified fire ratings. Certify that the units supplied are U.L. listed as a "Steel Floor and Form Unit".
- E. Insurance Certification: Assist the Government in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance.

STEEL DECKING

05 31 00 - 1

## 1.5 QUALITY ASSURANCE

- A. Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.

## 1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
- A36/A36M-08.....Standard Specification for Carbon Structural Steel
  - A611-97.....Standard Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled
  - A653/A653M-08.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
  - C423-08a.....Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- C. American Institute of Steel Construction (AISC):
- 1. Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design (Latest Edition)
  - 2. Load and Resistance Factor Design Specification for Structural Steel Buildings (Latest Edition)
- D. American Iron and Steel Institute (AISI):
- 1. Specification and Commentary for the Design of Cold-Formed Steel Structural Members
- E. American Welding Society (AWS):
- D1.3-08.....Structural Welding Code - Sheet Steel
- F. Factory Mutual (FM Global):
- 1. Loss Prevention Data Sheet 1-28: Design Wind Loads (2002)
  - 2. Factory Mutual Research Approval Guide (2005)
- G. Military Specifications (Mil. Spec.)
- MIL-P-21035B.....Paint, High Zinc Dust Content, Galvanizing Repair (2003)

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Steel Decking: ASTM A653, Structural Quality.

STEEL DECKING

05 31 00 - 2

- B. Galvanizing: ASTM A653, G60.
- C. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035B.
- D. Primer for Shop Painted Sheets: Manufacturer's standard primer (2 coats). When finish painting of steel decking is specified in Section 09 91 00, PAINTING primer coating shall be compatible with specified finish painting.
- E. Miscellaneous Steel Shapes: ASTM A36.
- F. Welding Electrode: E60XX minimum.
- G. Sheet Metal Accessories: ASTM A653, galvanized, unless noted otherwise. Provide accessories of every kind required to complete the installation of metal decking in the system shown. Finish sheet metal items to match deck including, but not limited to, the following items:
  - 1. Metal Cover Plates: For end-abutting deck units, to close gaps at changes in deck direction, columns, walls and openings. Same quality as deck units but not less than 1.3 mm (18 gauge) sheet steel.
  - 2. Continuous Sheet Metal Edging: At openings, concrete slab edges and roof deck edges. Same quality as deck units but not less than 1.3 mm (18 gauge) steel. Side and end closures supporting concrete and their attachment to supporting steel shall be designed by the manufacturer to safely support the wet weight of concrete and construction loads. The deflection of cantilever closures shall be limited to 3 mm (1/8 inch) maximum.
  - 3. Metal Closure Strips: For openings between decking and other construction, of not less than 1.3 mm (18 gauge) sheet steel of the same quality as the deck units. Form to the configuration required to provide tight-fitting closures at open ends of flutes and sides of decking.
  - 4. Ridge and Valley Plates: Provide 1.3 mm (18 gauge), minimum 100 mm (4 inch) wide ridge and valley plates where roof slope exceeds 40 mm per meter (1/2 inch per foot).
  - 5. Cant Strips: Provide bent metal 45 degree leg cant strips where indicated on the Drawings. Fabricate cant strips from 1 mm (20 gauge) metal with a minimum 125 mm (5 inch) face width.
  - 6. Seat Angles for Deck: Provide where a beam does not frame into a column.
  - 7. Sump Pans for Roof Drains: Fabricated from single piece of minimum 1.9 mm (14 gauge) galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with

bearing flanges not less than 75 mm (3 inches) wide. Recess pans not less than 38 mm (1 1/2 inches) below roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.

## **2.2 REQUIREMENTS**

- A. Provide steel decking of the type, depth, gauge, and section properties as shown.
- B. Metal Roof Deck: Single pan fluted units with flat horizontal top surfaces utilized to act as a permanent support for all superimposed loads. Comply with the depth and minimum gage requirements as shown on the Contract Documents.
  - 1. Intermediate Rib (Type F) deck.
  - 2. Finish: Galvanized G-60.
- C. Do not use unfilled steel deck for hanging supports for any type or kind of building components including suspended ceilings, electrical light fixtures, plumbing, heating, or air conditioning pipes or ducts or electrical conduits.

## **PART 3 - EXECUTION**

### **3.1 ERECTION**

- A. Do not start installation of metal decking until corresponding steel framework has been plumbed, aligned and completed and until temporary shoring, where required, has been installed. Remove any oil, dirt, paint, ice, water and rust from steel surfaces to which metal decking will be welded.
- B. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- C. Do not use floor deck units for storage or working platforms until permanently secured. Do not overload deck units once placed. Replace any deck units that become damaged after erection and prior to casting concrete at no cost to the Government.
- D. Provide steel decking in sufficient lengths to extend over 3 or more spans.
- E. Place steel decking units at right angles to supporting members. End laps of sheets of roof deck shall be a minimum of 50 mm (2 inches) and shall occur over supports.
- F. Fastening Deck Units:
  - 1. Fasten floor deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal

strength, spaced not more than 305 mm (12 inches) o.c. with a minimum of two welds per unit at each support. Where two units abut, fasten each unit individually to the supporting steel framework.

2. Tack weld or use self-tapping No. 8 or larger machine screws at 915 mm (3 feet) o.c. for fastening end closures. Only use welds to attach longitudinal end closures.
3. Weld side laps of adjacent floor deck units that span more than 1524 mm (5 feet). Fasten at midspan or 915 mm (3 feet) o.c., whichever is smaller.
4. Fasten roof deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength, spaced not more than 305 mm (12 inches) o.c. at every support, and at closer spacing where required for lateral force resistance by diaphragm action. Attach split or partial panels to the structure in every valley. In addition, secure deck to each supporting member in ribs where side laps occur. Power driven fasteners may be used in lieu of welding for roof deck if strength equivalent to the welding specified above is provided. Submit test data and design calculations verifying equivalent design strength.
5. Mechanically fasten side laps of adjacent roof deck units with spans greater than 1524 mm (5 feet) between supports, at intervals not exceeding 915 mm (3 feet) o.c., or midspan, whichever is closer, using self-tapping No. 8 or larger machine screws.
6. Provide any additional fastening necessary to comply with the requirements of Underwriters Laboratories and/or Factory Mutual to achieve the required ratings.
7. Uplift Loading: Install and anchor roof deck units to resist gross uplift loading of 2.1 kPa (45 psf) at eave overhang and 1.4 kPa (30 psf) for other roof areas.
8. Weld end laps of corrugated form deck units in valley of side lap and at middle of sheet (maximum spacing of welds is 380 mm (15 inches)).
9. Weld corrugated deck to intermediate supports in an X pattern. Weld in valley of side laps on every other support and in the valley of the center corrugation on the remaining supports (maximum spacing of welds is 760 mm (30 inches)).

G. Cutting and Fitting:

1. Cut all metal deck units to proper length in the shop prior to shipping.

2. Field cutting by the metal deck erector is restricted to bevel cuts, notching to fit around columns and similar items, and cutting openings that are located and dimensioned on the Structural Drawings.
3. Other penetrations shown on the approved metal deck shop drawings but not shown on the Structural Drawings are to be located, cut and reinforced by the trade requiring the opening.
4. Make all cuts neat and trim using a metal saw, drill or punchout device; cutting with torches is expressly prohibited.
5. Do not make any cuts in the metal deck that are not shown on the approved metal deck drawings. If an additional opening not shown on the approved shop drawings is required, submit a sketch, to scale, locating the required new opening and any other openings and supports in the immediate area. Do not cut the opening until the sketch has been reviewed and accepted by the RE/COTR. Provide any additional reinforcing or framing required for the opening at no cost to the Government. Failure to comply with these requirements is cause for rejection of the work and removal and replacement of the affected metal deck.
6. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

### **3.2 WELDING**

Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.3.

### **3.3 FIELD REPAIR**

1. Areas scarred during erection.
2. Welds to be thoroughly cleaned and touched-up. Touch-up paint for zinc-coated units shall be zinc rich galvanizing repair paint.

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STEEL DECKING

05 31 00 - 6



**SECTION 05 36 00  
COMPOSITE METAL DECKING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies material and services required for installation of composite steel decking including shear connector studs and miscellaneous closures required to prepare deck for concrete placement as shown and specified.

**1.2 RELATED WORK**

Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

**1.3 DESIGN REQUIREMENTS**

- A. Design steel decking in accordance with American Iron And Steel Institute publication "Specifications for the Design of Cold Formed Steel Structural Members", except as otherwise shown or specified.
- B. Design all elements with the latest published version of applicable codes.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Shop and erection drawings showing decking unit layout, connections to supporting members, and information necessary to complete the installation as shown and specified, including supplementary framing, cant strips, cut openings, special jointing or other accessories. Show welding, side lap, closure, deck reinforcing and closure reinforcing details. Show openings required for work of other trades, including openings not shown on structural drawings. Indicate where temporary shoring is required to satisfy design criteria.
- C. Manufacturer's Literature and Data: Showing steel decking section properties and specifying structural characteristics as specified herein.
- D. Manufacturer's written recommendations for:
  - 1. Shape of decking section to be used.
  - 2. Cleaning of steel decking prior to concrete placement.
- E. Test Report - Establishing structural characteristics of composite concrete and steel decking system.
- F. Test Report - Stud base qualification.

COMPOSITE METAL DECKING

05 36 00 - 1

- G. Welding power setting recommendation by shear stud manufacturer.
- H. Shear Stud Layouts: Submit drawings showing the number, pattern, spacing and configuration of the shear studs for each beam and girder.
- I. Certification: For each type and gauge of metal deck supporting concrete slab or fill, furnish certification of the specified fire ratings. Certify that the units supplied are U.L. listed as a "Steel Floor and Form Unit".

### 1.5 QUALITY ASSURANCE

Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.

### 1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only. Refer to the latest edition of all referenced Standards and codes.
- B. American Iron and Steel Institute (AISI):  
Specification and Commentary for the Design of Cold-Formed Steel Structural Members (Latest Edition).
- C. American Society of Testing and Materials (ASTM):  
A36/A36M-08.....Standard Specification for Carbon Structural Steel  
A108-07.....Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality  
A653/A653M-08.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process  
A780/A780M-09.....Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings
- D. American Institute of Steel Construction (AISC):
  - 1. Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design (Latest Edition)
  - 2. Load and Resistance Factor Design Specification for Structural Steel Buildings (Latest Edition)
- E. American Welding Society (AWS):  
D1.1.....Structural Welding Code - Steel  
D1.3.....Structural Welding Code - Sheet Steel
- F. Military Specifications (Mil. Spec.):

MIL-P-21035B.....Paint, High Zinc Dust Content, Galvanizing  
Repair

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Steel Decking and all Flashings: ASTM A653.
- B. Galvanizing: ASTM A653, G60, Grade 33.
- C. Shear connector studs: ASTM A108, Grades 1015-1020, yield 350 Mpa (50,000 psi) minimum, tensile strength - 400 Mpa (60,000 psi) minimum, reduction of area 50 percent minimum. Studs of uniform diameter; heads shall be concentric and normal to shaft; stud, after welding free from any substance or defect which would interfere with its function as a shear connector. Studs shall not be painted or galvanized. Size of studs shall be as shown on drawings. Studs manufactured by a company normally engaged in the manufacture of shear studs and can furnish equipment.
- D. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035B.
- E. Miscellaneous Steel Shapes: ASTM A36.
- F. Welding Electrode: E60XX minimum.
- G. Sheet Metal Accessories: ASTM A653, galvanized, unless noted otherwise. Provide accessories of every kind required to complete the installation of metal decking in the system shown. Finish sheet metal items to match deck including, but not limited to, the following items:
  - 1. Metal Cover Plates: For end-abutting deck units, to close gaps at changes in deck direction, columns, walls and openings. Same quality as deck units but not less than 1.3 mm (18 gauge) sheet steel.
  - 2. Continuous sheet metal edging at openings. Same quality as deck units but not less than 1.3 mm (18 gauge) steel.
  - 3. Metal Closure Strips: For openings between decking and other construction, of not less than 1.3 mm (18 gauge) sheet steel of the same quality as the deck units. Form to the configuration required to provide tight-fitting closures at open ends of flutes and sides of decking.
  - 4. Seat angles for deck: Where a beam does not frame into a column.

### **2.2 REQUIREMENTS**

- A. Steel decking depth, gage, and section properties to be as shown. Provide edges of deck with vertical interlocking male and female lip providing for a positive mechanical connection.

- B. Steel decking units shall include an integral system which provides a simple point of attachment for hanger devices for flexibility for attaching hangers for support of acoustical, lathing, plumbing, heating, air conditioning and electrical items.

### **PART 3 - EXECUTION**

#### **3.1 ERECTION**

- A. Do not start installation of metal decking until corresponding steel framework has been plumbed, aligned and completed and until temporary shoring, where required, has been installed. Remove any oil, dirt, paint, ice, water and rust from steel surfaces to which metal decking will be welded.
- B. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- C. Erect steel deck in accordance with manufacturer's printed instructions.
- D. Ship steel deck units to project in standard widths and cut to proper length.
- E. Provide steel decking in sufficient lengths to extend over 3 or more spans, except where structural steel layout does not permit.
- F. Place steel decking units on supporting steel framework and adjust to final position before being permanently fastening. Bring each unit to proper bearing on supporting beams. Place deck units in straight alignment for entire length of run of flutes and with close registration of flutes of one unit with those of abutting unit. Maximum space between ends of abutting units is 13 mm (1/2 inch). If space exceeds 13 mm (1/2 inch), install closure plates at no additional cost to Government.
- G. Ceiling hanger loops, if used, must be flattened or removed to obtain bearing of units on structural steel.
- H. Fastening Deck Units:
  - 1. Fasten floor deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds.
  - 2. Tack weld or use self-tapping No. 8 or larger machine screws located as indicated for fastening end closures. Only use welds to attach longitudinal end closures.
  - 3. Weld side laps and perimeter edge as indicated.
- I. Welding to conform to AWS D1.3 and done by competent experienced welding mechanics.
- J. Areas scarred during erection, comply with ASTM A780.
- K. Cutting and Fitting:

1. Cut all metal deck units to proper length in the shop prior to shipping.
  2. Field cutting by the metal deck erector is restricted to bevel cuts, notching to fit around columns and similar items, and cutting openings that are located and dimensioned on the structural drawings.
  3. Other penetrations shown on the approved metal deck shop drawings but not shown on the structural drawings are to be located, cut and reinforced by the trade requiring the opening.
  4. Make all cuts neat and trim using a metal saw, drill or punchout device; cutting with torches is expressly prohibited.
  5. Do not make any cuts in the metal deck that are not shown on the approved metal deck drawings. If an additional opening not shown on the approved shop drawings is required, submit a sketch, to scale, locating the required new opening and any other openings and supports in the immediate area. Do not cut the opening until the sketch has been reviewed and accepted by the RE/COTR. Provide any additional reinforcing or framing required for the opening at no cost to the Government. Failure to comply with these requirements is cause for rejection of the work and removal and replacement of the affected metal deck.
  6. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.
- L. Installation of shear connector studs through previously installed metal deck to conform to AWS D1.1, Section 7, except all studs will be installed with automatically timed welding equipment and as specified below:
1. Do not place reinforcing steel temperature mesh or other materials and equipment which will interfere with stud installation on steel deck until shear connector studs are installed.
  2. Steel deck sheets shall be free of oil, rust, dirt, and paint. Release water in deck's valley so that it does not become entrapped between deck and beam. Surface to which stud is to be welded shall be clean and dry.
  3. Rest metal deck tightly upon top flange of structural member with bottom of deck rib in full contact with top of beam flange.

4. Weld studs only through a single thickness of deck. Place decking so that a butt joint is obtained. Place studs directly over beam web, where one row of studs are required.
5. Ferrules specially developed for the weld-through technique must be used. Ferrules shall be appropriate for size of studs used and be removed after welding.
6. Submit report of successful test program for stud base qualification as required by AWS D1.1, Appendix K.

### **3.2 CLEANING**

Clean deck in accordance with manufacturer's recommendation before concrete placement.

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**SECTION 05 50 00  
METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.
- B. Items specified:
  - 1. Support for wall and ceiling mounted items.
  - 2. Loose Lintels.
  - 3. Shelf Angles.

**1.2 RELATED WORK**

- A. Colors, finishes, and textures: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Prime and finish painting: Section 09 91 00, PAINTING.
- C. Stainless steel corner guards: Section 10 26 00, WALL AND DOOR PROTECTION.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS AND PRODUCT DATA.
- B. Shop Drawings:
  - 1. Indicate each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
  - 2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
  - 3. Provide templates and rough-in measurements as required.
- C. Manufacturer's Certificates:
  - 1. Anodized finish as specified.
  - 2. Live load designs as specified.
- D. Submit Design Calculations for specified live loads including dead loads prepared by professional engineer licensed in the location of their practice.
- E. Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning

of items having anchors to be built into concrete or masonry construction.

#### **1.4 QUALITY ASSURANCE**

- A. Each manufactured product must meet or exceed the requirements specified, and be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- B. Each product type to be the same and be made by the same manufacturer.
- C. Assembled product to the greatest extent possible before delivery to the site.
- D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

#### **1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American Society of Mechanical Engineers (ASME):
  - 1. B18.2.2-10 - Nuts for General Applications
- C. American Society for Testing and Materials (ASTM):
  - 1. A36/A36M-12 - Carbon Structural Steel
  - 2. A123/A123M-12 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 3. A307-12 - Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
  - 4. A500/A500M-10a - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
  - 5. A653/A653M-11 - Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process
  - 6. C1107/C1107M-13 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
  - 7. E488-10 - Strength of Anchors in Concrete Elements
  - 8. F436-11 - Hardened Steel Washers



- D. American Welding Society (AWS)
- E. National Association of Architectural Metal Manufacturers (NAAMM):
  - 1. AMP 500-06-2006 - Metal Finishes Manual
- F. Structural Steel Painting Council (SSPC):
  - 1. SSPC-SP 2 - Hand Tool Cleaning
  - 2. SSPC-SP 3 - Power Tool Cleaning

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Structural Steel: ASTM A36.
- B. Structural Tubing: ASTM A500.
- C. Primer Paint: As specified in Section 09 91 00, PAINTING.
- D. Modular Channel Units:
  - 1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
  - 2. Form channel with in-turned pyramid shaped clamping ridges on each side.
  - 3. Provide case hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn so as to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
  - 4. Factory finish channels and parts with oven baked primer when exposed to view. Channels fabricated of ASTM A653, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
- E. Grout: ASTM C1107, pourable type.

### **2.2 HARDWARE**

- A. Rough Hardware:
  - 1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
  - 2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal is used.

- B. Anchor Bolts: ASTM A307; same material, color, and finish as the metal to which applied when exposed.
- C. Expansion Anchors: Design values listed must be as tested according to ASTM E488.
- D. Lag Screws and Bolts: ASME B18.2.1, type and grade best suited for the purpose.
- E. Toggle Bolts: ASME B18.2.1.
- F. Bolts, Nuts, Studs and Rivets: ASME B18.2.2 or ASTM A307.
- G. Washers: ASTM F436, type to suit material and anchorage.

### **2.3 FABRICATION**

- A. General:
  - 1. Provide for items that do not form a part of the structural steel framework, such as lintels, sill angles, support framing for ceiling-mounted toilet partitions, miscellaneous mountings and frames.
  - 2. Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as required to support wall loads over openings. Provide with connections and welds.
  - 3. Construct to have at least 200 mm (8 inches) bearing on masonry at each end.
  - 4. Provide angles and plates, ASTM A36, for embedment as indicated.
  - 5. Galvanize embedded items exposed to the elements according to ASTM A123.
- B. Material:
  - 1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
  - 2. Use material free of defects which could affect the appearance or service ability of the finished product.
- C. Size:
  - 1. Size and thickness of members as shown.
- D. Connections:
  - 1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
  - 2. Field riveting will not be approved.

3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punch or drill; burrs removed.
5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable member's machine screws or bolts.

E. Fasteners and Anchors:

1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self-drilling and tapping screws or bolts.

F. Workmanship:

1. General:
  - a. Fabricate items to design shown.
  - b. Furnish members in longest lengths commercially available within the limits shown and specified.

- c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
  - d. Provide holes, sinkages, and reinforcement shown and required for fasteners and anchorage items.
  - e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
  - f. Prepare members for the installation and fitting of hardware.
  - g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.
  - h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
2. Welding:
- a. Weld in accordance with AWS standards as listed in article Applicable Publications.
3. Joining:
- a. Miter or butt members at corners.
  - b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
4. Anchors:
- a. Provide as indicated.
5. Cutting and Fitting:
- a. Accurately cut, machine and fit joints, corners, copes, and miters.
  - b. Fit removable members to be easily removed.
  - c. Design and construct field connections in the most practical place for appearance and ease of installation.
  - d. Fit pieces together as required.
  - e. Fabricate connections for ease of assembly and disassembly without use of special tools.
  - f. Joints firm when assembled.
  - g. Conceal joining, fitting and welding on exposed work as far as practical.
  - h. Do not show rivets and screws prominently on the exposed face.
  - i. Fabricate fit of components and the alignment of holes to eliminate the need to modify component or to use exceptional

force in the assembly of item and eliminate the need to use other than common tools.

G. Finish:

1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.

2. Steel and Iron: NAAMM AMP 500.

a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.

b. Surfaces exposed in the finished work:

1) Finish smooth rough surfaces and remove projections.

2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.

c. Shop Prime Painting:

1) Surfaces of Ferrous Metal:

a) Provide as defined in SSPC-SP2 and SP3.

H. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

## 2.4 SUPPORTS

A. General:

1. Fabricate ASTM A36 structural steel shapes as shown.

2. Use clip angles or make provisions for welding hangers and braces to overhead construction.

3. Field connections may be welded or bolted.

B. For Ceiling Hung Toilet Stall:

1. Use a continuous steel channel above pilasters with hangers centered over pilasters.

2. Make provision for installation of stud bolts in lower flange of channel.

3. Provide a continuous steel angle at wall and channel braces spaced as shown.

4. Use threaded rod hangers.

5. Provide diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.

**2.5 LOOSE LINTELS**

- A. Furnish lintels of sizes shown.
- B. Fabricate lintels with not less than 150 mm (6 inch) bearing at each end for nonbearing masonry walls, and 200 mm (8 inch) bearing at each end for bearing walls.

**2.6 SHELF ANGLES**

- A. Fabricate from steel angles of size shown.
- B. Attach shelf angle as indicated.

**2.7 HANDRAILS**

- A. Design Criteria: 900 N (200 pounds) in any direction at any point.
- B. Provide continuous welded joints, dressed smooth and flush.
- C. Standard flush fittings, designed to be welded, may be used.
- D. Exposed threads will not be approved.
- E. Form handrail brackets to size and design shown.
- F. Close free ends of rail with flush metal caps welded in place except where flanges for securing to walls with bolts are shown.
- G. Make provisions for attaching handrail brackets to wall, posts, and handrail as shown.

**PART 3 - EXECUTION****3.1 INSTALLATION, GENERAL**

- A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Items set into concrete or masonry.
  - 1. Provide temporary bracing for such items until concrete or masonry is set.
  - 2. Place in accordance with setting drawings and instructions.
  - 3. Build strap anchors, into masonry as work progresses.
- C. Field weld in accordance with AWS.
  - 1. Design and finish as specified for shop welding.
  - 2. Use continuous weld unless specified otherwise.
- D. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified.

Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.

- E. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.

### **3.2 INSTALLATION OF SUPPORTS**

#### **A. Anchorage to Structure:**

1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.
2. Secure supports to concrete inserts by bolting or continuous welding.
3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts unless shown otherwise.
4. Secure steel plate or hat channels to studs as detailed on shop drawings.

#### **B. Ceiling Hung Toilet Stalls:**

1. Securely anchor hangers of continuous steel channel above pilasters to structure above.
2. Bolt continuous steel angle at wall to masonry or weld to face of each metal stud.
3. Secure brace for steel channels over toilet stall pilasters to wall angle supports with bolts at each end spaced as shown.
4. Install diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.
5. Install stud bolts in lower flange of channel before installing furred down ceiling over toilet stalls.
6. Install support for ceiling hung pilasters at entrance screen to toilet room similar to toilet stall pilasters.

### **3.3 STEEL LINTELS**

- A. Use lintel sizes and combinations shown or specified.
- B. Install lintels with longest leg upstanding, except for openings in 150 mm (6 inch) masonry walls install lintels with longest leg horizontal.

- C. Install lintels to have not less than 150 mm (6 inch) bearing at each end for nonbearing walls, and 200 mm (8 inch) bearing at each end for bearing walls.

### **3.4 SHELF ANGLES**

- A. Anchor shelf angles with 19 mm (3/4 inch) bolts unless shown otherwise in adjustable malleable iron inserts, set level at elevation shown.
- B. Provide expansion space at end of members.

### **3.5 STEEL COMPONENTS FOR MILLWORK ITEMS**

- A. Coordinate and deliver to Millwork fabricator for assembly where millwork items are secured to metal fabrications.

### **3.6 CLEAN AND ADJUSTING**

- A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.
- B. Clean after installation exposed prefinished and plated items and items fabricated from aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

- - - END - - -



**SECTION 06 10 00  
ROUGH CARPENTRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Section specifies countertop construction, wood blocking, sheathing, furring, nailers, and rough hardware.

**1.2 RELATED WORK**

- A. Milled Woodwork: Section 06 20 00, FINISH CARPENTRY.

**1.3 PERFORMANCE REQUIREMENTS**

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Provide documentation of conformance with performance requirements of this section.
- C. Prepare shop drawings showing framing connection details, fasteners, connections and dimensions.

**1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Protect lumber and other products from dampness both during and after delivery at site.
- B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.
- C. Stack plywood and other board products so as to prevent warping.
- D. Locate stacks on well drained areas, supported at least 150 mm (6 inches) above grade and cover with well-ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

**1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American Forest and Paper Association (AF&PA):
  - 1. Wood Structural Design Data

- C. American Lumber Standard Committee, Incorporated (ALSC):
  - 1. ALSC Board of Review
- D. American Plywood Association (APA):
  - 1. E30-2011 - Engineered Wood Construction Guide
- E. American Society of Mechanical Engineers (ASME):
  - 1. B18.6.1-81 (R2008) - Wood Screws
- F. American Society for Testing and Materials (ASTM):
  - 1. A307-10 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
  - 2. C954-11 - Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
  - 3. C1002-07 - Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
  - 4. D6007-02 - Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber
  - 5. E1333-10 - Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber
  - 6. F844-07a - Washers, Steel, Plan (Flat) Unhardened for General Use
  - 7. F1667-11a-e1 - Nails, Spikes, and Staples
- G. American Wood Protection Association (AWPA)
- H. FM Global Group (FM):
  - 1. FM 4435 - Approval Standard for Edge Systems Used with Low Slope Roofing Systems
- I. Green Seal (GS):
  - 1. GS-36 - (2013) Commercial Adhesives
- J. South Coast Air Quality Management District (SCAQMD):
  - 1. SCAQMD Rule 1168 - (1989; R2005) Adhesive and Sealant Applications
- K. U.S. Department of Commerce/National Institute of Science and Technology:
  - 1. PS 1-09 - Structural Plywood

**PART 2 - PRODUCTS****2.1 LUMBER**

- A. Unless otherwise specified, each piece of lumber to bear a grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.
  - 1. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
  - 2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.
- B. Structural Members: Species and grade as listed in the AF&PA, National Design Specification for Wood Construction having design stresses as shown.
- C. Lumber Other Than Structural:
  - 1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
  - 2. Framing lumber: Minimum extreme fiber stress in bending of 1100.
  - 3. Furring, blocking, nailers and similar items 100 mm (4 inches) and narrower Standard Grade; and, members 150 mm (6 inches) and wider, Number 2 Grade.
- D. Sizes:
  - 1. Conforming to Prod. Std. PS20.
  - 2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.
- E. Moisture Content:
  - 1. At time of delivery and maintained at the site.
  - 2. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
  - 3. Lumber over 50 mm (2 inches) thick: 25 percent or less.
- F. Preservative Treatment:
  - 1. Do not treat Heart Redwood and Western Red Cedar.
  - 2. Products containing chromium or arsenic will not be permitted.
- G. Waterborne Wood Preservatives:

1. Treat wood products with waterborne wood preservatives listed in Section 4 of AWPA Standards U1, excluding those which contain arsenic and/or chromium.
2. Pressure treatment of wood products must conform to the requirements of AWPA Standards U1 and T1.
3. Retention of preservatives as prescribed in AWPA Standard U1 for the following Use Categories (material conforming to a higher AWPA Use Category may be specified):
  - a. UC1: Interior construction - above ground, dry conditions.
  - b. UC2: Interior construction - above ground, damp conditions.
  - c. UC3A: Exterior construction - above ground, coated and with rapid water runoff.
  - d. UC3B: Exterior construction - above ground, uncoated or poor water runoff.
  - e. UC4A: General purpose soil or fresh water contact - heavy duty above ground.
  - f. UC4B: Heavy duty soil or fresh water contact - critical or difficult to replace components.
  - g. UC4C: Extreme duty soil or fresh water contact - critical structural components.
- H. Fire-retardant Treatment:
  1. Fire-retardant-treated wood products to be free of halogens, sulfates, ammonium phosphate and formaldehyde.
  2. Fire retardant treatment of wood products to conform to the requirements of AWPA Standard U1, Commodity Specification H and AWPA Standard T1, Section H.

## 2.2 PLYWOOD

- A. Comply with Prod. Std. PS 1 and APA E30.
- B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.
- C. Sheathing:
  1. APA rated Exposure 1 or Exterior; panel grade CD or better.
  2. Wall Sheathing:

- a. Minimum 9 mm (11/32 inch) thick with supports 400 mm (16 inches) on center and 12 mm (15/32 inch) thick with supports 600 mm (24 inches) on center unless specified otherwise.
  - b. Minimum 1200 mm (48 inches) wide at corners without corner bracing of framing.
3. Roof Sheathing:
- a. Minimum 9 mm (11/32 inch) thick with span rating 24/0 or 12 mm (15/32 inch) thick with span rating for supports 400 mm (16 inches) on center unless specified otherwise.
  - b. Minimum 15 mm (19/32 inch) thick or span rating of 40/20 or 18 mm (23/32 inch) thick or span rating of 48/24 for supports 600 mm (24 inches) on center.

### 2.3 ROUGH HARDWARE

- A. Anchor Bolts: ASTM A307, size as indicated, complete with nuts and washers.
- B. Washers:
  - 1. ASTM F844.
  - 2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.
- C. Screws:
  - 1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.
  - 2. Wood to Steel: ASTM C954, or ASTM C1002.
- D. Nails:
  - 1. ASTM F1667:
    - a. Common: Type I, Style 10.
    - b. Concrete: Type I, Style 11.
    - c. Barbed: Type I, Style 26.
    - d. Underlayment: Type I, Style 25.
    - e. Masonry: Type I, Style 27.

### 2.4 BLOCKING

- A. General: Provide miscellaneous lumber as indicated and lumber support or attachment for other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Furring.

- B. Provide Standard or No. 2 Grade lumber.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS**

- A. Conform to applicable requirements of the following:
  - 1. Comply with APA standards for installation of plywood.
- B. Anchors in Masonry: Except where indicated otherwise, embed anchor bolts not less than 400 mm (15 inches) in masonry unit walls and provide each with a nut and a 50 mm (2 inch) diameter washer at bottom end. Fully grout bolts with mortar.
- C. Anchors in Concrete:
  - 1. Except where indicated otherwise, embed anchor bolts not less than 200 mm (8 inches) in poured concrete walls and provide each with a nut and a 50 mm (2 inch) diameter washer at bottom end.
  - 2. A bent end may be substituted for the nut and washer; bend to be not less than 90 degrees.
  - 3. Powder-actuated fasteners spaced 900 mm (3 feet) o.c. may be provided instead of bolts for single thickness plates on concrete.
- D. Sheathing:
  - 1. Lay panels with joints staggered, with edge and ends 3 mm (1/8 inch) apart and nailed over bearings as specified.
  - 2. Set nails not less than 9 mm (3/8 inch) from edges.
  - 3. Install 50 mm by 100 mm (2 inch by 4 inch) blocking spiked between studs to support edge or end joints of panels.
- E. Wood Roof Nailers, Edge Strips, Crickets, Curbs, and Cants: Provide sizes and configurations indicated or specified and anchored securely to continuous construction.
  - 1. Roof Edge Strips and Nailers: Provide at perimeter of roof, around openings through roof, and where roofs abut walls, curbs, and other vertical surfaces.
  - 2. Except where indicated otherwise, nailers to be 150 mm (6 inches) wide and the same thickness as the insulation. Anchor nailers securely to underlying construction.
  - 3. Anchor perimeter nailers in accordance with FM 4435.

4. Crickets, Cants, and Curbs: Provide wood saddles or crickets, cant strips, .
- F. 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.
- G. Wood Grounds: Provide for fastening wood trim, finish materials, and other items to plastered walls and ceilings. Install grounds in proper alignment and true with a 2400 mm (8 foot) straightedge.
- H. Wood Furring:
  1. Provide where shown and as necessary for facing materials specified.
  2. Except as shown otherwise, furring strips to be nominal one by 3, continuous, and spaced 400 mm (16 inches) o.c. Erect furring vertically or horizontally as necessary.
  3. Nail furring strips to masonry.
  4. Do not use wood plugs.
  5. Provide furring strips around openings, behind bases, and at angles and corners.
  6. Furring to be plumb, rigid, and level and shimmed as necessary to provide a true, even plane with surfaces suitable to receive the finish required.

### 3.2 PROTECTION

- A. Protect rough carpentry from weather.
- B. If rough carpentry becomes wet, apply EPA-registered borate treatment complying with EPA registered label.

- - - END - - -

**SECTION 06 20 00  
FINISH CARPENTRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section specifies solid surface countertops.

**1.2 RELATED WORK**

A. Fabricated Metal brackets, bench supports and countertop legs: Section 05 50 00, METAL FABRICATIONS.

B. Framing, furring and blocking: Section 06 10 00, ROUGH CARPENTRY.

C. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Provide documentation of conformance with performance requirements of this section.

C. Shop Drawings:

1. Millwork: Half size scale for sections and details; 1:50 (1/4-inch) for elevations and plans.

a.

2. Indicate materials and details of construction, methods of fastening, erection, and installation.

D. Certificates:

1. Indicate preservative treatment of materials meet the requirements specified.

2. Indicating moisture content of materials meet the requirements specified.

E. List of acceptable sealers for fire retardant and preservative treated materials.

F. Manufacturer's literature and data:

1. Finish hardware.

2. Sinks with fittings.

3. Electrical components.

**1.4 DELIVERY, STORAGE AND HANDLING**

A. Protect lumber and millwork from dampness, maintaining moisture content specified both during and after delivery at site.



B. Store finishing lumber and millwork in weathertight well ventilated structures or in space in existing buildings designated by RE/COR. Store at a minimum temperature of 210C (700F) for not less than 10 days before installation.

C. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

## **1.5 APPLICABLE PUBLICATIONS**

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

B. American Society of Mechanical Engineers (ASME):

1. B18.2.1-2012 - Square, Hex, Heavy Hex and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws
2. B18.2.2-2010 - Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)

C. American Wood-Preservers' Association (AWPA)

D. Architectural Woodwork Institute (AWI):

1. Architectural Woodwork Standards and Quality Certification Program (2009)

## **PART 2 - PRODUCTS**

### **2.1 PLYWOOD**

A. Softwood Plywood:

1. Prod. Std.
2. Grading and Marking:
  - a. Each sheet of plywood must bear the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood.
  - b. The mark must identify the plywood by species group or identification index, and show glue type, grade, and compliance with PS1.
3. Plywood, 13 mm (1/2 inch) and thicker; not less than five ply construction, except 32 mm (1-1/4 inch) thick plywood not less than seven ply.

**2.2 SOLID SURFACE COUNTERTOPS**

A. Comply with AWI Section 400 and ANSI Z124.3 requirements for countertops.

**2.3 ADHESIVE**

A. Product compliant with performance requirements.

**2.4 HARDWARE**

A. Rough Hardware:

1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electric-galvanizing process. Provide galvanized where indicated.
2. Use galvanized coating on ferrous metal for exterior work unless non-ferrous metals or stainless is used.
3. Fasteners:
  - a. Bolts with Nuts: ASME B18.2.1 and ASME B18.2.2.
  - b. Screws: ASMC B18.6.1.

**2.5 FABRICATION**

A. General:

1. Provide interior woodwork complying with referenced quality standard.
2. Use AWI Custom Grade for architectural woodwork and interior millwork, except as otherwise indicated.
3. Finish woodwork must be free from pitch pockets.
4. Provide trim as standard stock molding and members of the same species, except where special profiles are shown.
5. Plywood cannot be less than 13 mm (1/2 inch), unless otherwise shown or specified.
6. Edges of members in contact with concrete or masonry to have a square corner caulking rebate.
7. Fabricate members less than 4 m (14 feet) in length from one piece of lumber, back channeled and molded as shown.

**PART 3 - EXECUTION****3.1 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain work areas and storage areas to a minimum temperature of 210C (700F) for not less than 10 days before and during installation of interior millwork.
- B. Do not install finish lumber or millwork in any room or space where wet process systems such as concrete, masonry, or plaster work are not complete and dry.

**3.2 INSTALLATION****A. General:**

1. Install to comply with AWI 1700.
2. Millwork receiving transparent finish to be primed and back-painted on concealed surfaces; do not set millwork until primed and back-painted.
3. Secure trim with fine finishing nails, screws, or glue as required.
4. Set nails for putty stopping. Use washers under bolt heads where no other bearing plate occurs.
5. Seal cut edges of preservative and fire retardant treated wood materials with a certified acceptable sealer.
6. Coordinate with plumbing and electrical work for installation of fixtures and service connections in millwork items.
7. Plumb and level items unless shown otherwise.
8. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.
9. Exterior Work: Provide joints that are close fitted, mitered, tongue and grooved, rebated, or lapped to exclude water filled and sealed.
10. Install woodwork plumb and level to a tolerance of 3 mm in 2400 mm (1/8 inch in 96 inches).

- B. Install with butt joints in straight runs and miter at corners.

- - - END - - -

**SECTION 07 11 13  
BITUMINOUS DAMPPROOFING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Bituminous dampproofing on concrete surfaces.

**1.2 RELATED REQUIREMENTS**

- A. Concrete Foundation Walls: Section 03 30 53, (SHORT FORM) CAST-IN-PLACE CONCRETE.
- B. Masonry Surfaces Below Grade: Section 04 20 00, UNIT MASONRY.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
  - 1. D226/D226M-09 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
  - 2. D1227-13 - Emulsified Asphalt Used as a Protective Coating for Roofing.

**1.4 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Description of each product.
  - 2. Application instructions.

**1.5 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

**1.6 STORAGE AND HANDLING**

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

**1.7 WARRANTY**

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

**PART 2 - PRODUCTS**

**2.1 SYSTEM PERFORMANCE**

- A. Control moisture migration through concrete or masonry exterior walls where no hydrostatic head occurs or is anticipated.

**2.2 PRODUCTS - GENERAL**

- A. Provide each product from one manufacturer and from one production run.
- B. Cold Applied Bituminous Dampproofing:
  - 1. Asphalt: ASTM D1227, Type III (spray grade).

**2.3 ACCESSORIES**

- A. Asphalt Saturated Felt: ASTM D226/D226M, Type I, 7 kg (15 pound).

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
- D. Remove free water; surfaces may remain damp.

**3.2 INSTALLATION - GENERAL**

- A. Install products according to manufacturer's instructions.
  - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

**3.3 DAMPPROOFING INSTALLATION**

- A. Applications:
  - 1. Apply to surfaces where indicated on drawings.
- B. Apply dampproofing at 1 L/sq. m (2-1/2 gal. per 100 sq. ft.), minimum, each coat.
  - 1. Allow 24 hours drying time between coats.

**3.4 PROTECTION**

- A. Protect dampproofing from construction operations.
- B. Repair damage.

- - E N D - -

**SECTION 07 13 54**  
**THERMOPLASTIC SHEET WATERPROOFING**

**PART 1 - GENERAL**

**1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made part of this Section of the Specifications.

**1.2 DESCRIPTION**

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
1. Furnish and install thermoplastic sheet waterproofing over the assembled columbarium units.
  2. Provide openings as required and then seal membrane pin penetrations for granite cap pieces.

**1.3 RELATED WORK**

- A. Refer to the following sections for items relating to this work which are not included in this Section:
1. Section 03 48 24: PRECAST CONCRETE COLUMBARIUM UNITS.
  2. Section 04 05 16: MASONRY GROUTING.
  3. Section 04 43 00: CUT STONE.
- B. Submit the following in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES:
1. General: For each item specified in description of work or Part 2 - PRODUCTS, provide information showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, adhesives for PVC waterproofing attachment, finish, and location, size and type of pin penetration sealing. Mark items requiring field fabrication and furnish drawings and instruction for same.

**1.4 REFERENCE STANDARDS**

- A. The publications listed below form a part of this specification and the work shall comply with pertinent standards of the latest editions as specified below or by industry standards unless designated otherwise herein.
- B. American Society for Testing and Materials (ASTM):
- D570-98(2012)e1.....Water Absorption, Plastic Test Standard
- D751-06(2011).....Standard Test Methods for Coated Fabrics
- D1204-14.....Standard Test Method for Linear Dimensional Changes of Non-rigid Thermoplastic Sheeting or Film at Elevated Temperature

D2136-02(2012).....Standard Test Method for Coated Fabrics-Low  
Temperature Bend Test  
D4434/D4434M-15.....Standard Specifications for Poly(Vinyl Chloride)  
Sheet Roofing  
D5602/D5602M-11.....Standard Test Method for Static Puncture  
Resistance of Roofing Membrane Specimens  
D5635/D5635M-11.....Standard Test Method for Dynamic Puncture  
Resistance of Roofing Membrane Specimens

## **PART 2 - PRODUCTS**

### **2.1 WATERPROOFING MEMBRANE**

- A. Waterproofing membrane shall be a flexible, thermoplastic membrane manufactured using UV-resistant polyvinyl chloride and Elvaloy® KEE (ketone ethylene ester) formulation. Membrane shall be reinforced with a non-wicking polyester fabric and Aramid fiber-reinforced edge. Thickness tolerance shall not be less than 60-mils. Membrane shall be Johns Manville JM, GAF Everguard, Sika or approved equal.
- B. PVC membrane shall be available in rolls of either 1.52m x 30.48m (5' x 100') or 1.98m x 30.48m (6.5' x 100').
- C. Color to be white or gray.

### **2.2 PVC DETAIL MEMBRANES FOR PENETRATIONS**

- A. Non-reinforced thermoplastic membrane manufactured using an ultraviolet-resistant polyvinyl chloride and an Elvaloy® KEE (ketone ethylene ester) formulation suitable for fine detail work of wrapping setting pins and penetrations into the columbaria units.
- B. Follow manufacturer's instructions for hot air bonding and installation.

### **2.3 PVC MEMBRANE ADHESIVE**

- A. Water based, PVC membrane adhesive from same manufacturer as PVC membrane. Contractor is responsible for verification that adhesive is VOC compliant with EPA and California local rules and regulations. Adhesive shall be equivalent to Johns Manville JM, GAF Everguard, Sika or approved equal. Color to be white.
- B. Full coverage both surfaces required for proper adhesion. The net coverage rate of the PVC membrane adhesive shall be approximately 0.28l/m<sup>2</sup> (0.69 gal/100 ft<sup>2</sup>) of PVC membrane.

### **2.4 INSTALLATION ACCESSORIES**

As required for a complete assembly and sealing of all pins and penetrations.



**PART 3 - EXECUTION****3.1 INSPECTION**

- A. Prior to installation of any of the work in this section, contractor shall inspect the planned installation locations to insure that conditions are not significantly different from those indicated on the contract drawings. All materials shall be inspected prior to installation to insure compliance with the contract documents and to insure there is no damage.
- B. Should conditions be different from those indicated on the contract documents, contractor should immediately notify the Resident Engineer/Contracting Officer's Representative (RE/COR).

**3.2 PREPARATION**

- A. Verify that PVC membrane rolls will cover columbaria units completely, with no seaming required.
- B. Make sure that top surface of columbaria are clean, dry, smooth, and free of any foreign materials grease and oil. Clean as necessary and then allow precast concrete surface to dry thoroughly.

**3.3 INSTALLATION**

- A. Set all pins for cap stones prior to placing sheet membrane.
- B. Install PVC detail membrane over pins per manufacturer's instructions for a stretch collar hole. Collar of detail membrane should extend 25mm (1") up the pin face. Complete pin sealing prior to membrane placement.
- C. Carefully position the roll of PVC membrane with a 4570mm (15 foot) section unrolled to ensure proper alignment.
- D. Apply adhesive in front of the roll with a roller or brush, ensuring that the precast concrete substrate to be covered with the PVC membrane is fully coated. Prior to any film formation on the adhesive, carefully unroll the PVC membrane into the wet adhesive. Fold back the 4570mm (15 foot) sheet section and apply the adhesive onto the substrate to be covered with the membrane. Then carefully roll the 4570mm (15 foot) section of the membrane into the wet adhesive. Roll the bonded surface with a large, water-filled, lawn roller covered with carpet foam or broom to promote 100 percent adhesion.
- E. Slit the membrane only as necessary to stretch over stone setting pins. Field detail patch should allow for a minimum of 100mm (4-inches) of overlap. Hot air weld the PVC membrane to the detail membrane as the membrane is placed.
- F. Continue process until columbarium unit is completely covered. Intent is that each columbarium unit whether single-sided or back-to-back shall be covered with a single roll.

G. Trim membrane as required after rolling or brooming.

**3.4 CLEAN UP**

A. Clean up area of excess material and debris. Clean above ground portions of all columbaria units and stone veneer which may have been soiled by adhesive.

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**SECTION 07 22 00  
ROOF AND DECK INSULATION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Installation of roof and deck insulation, and vapor retarder on new construction ready to receive roofing or waterproof membrane.

**1.2 RELATED WORK**

- B. Wood blocking and edge strips: Section 06 10 00, ROUGH CARPENTRY.
- E. Sheet metal components: Section 07 60 00, FLASHING AND SHEET METAL.

**1.3 QUALITY CONTROL**

- A. Supervision of work by persons that are knowledgeable and experienced in roofing. See submittals for documentation of supervisor's qualification.
- B. Unless specified otherwise, comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to insulation for storage, handling, and application.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Asphalt materials, each type
  - 2. Roofing cement, each type
  - 3. Roof insulation, each type
  - 4. Fastening requirements
  - 5. Insulation span data for flutes of metal decks
- C. Samples:
  - 1. Roof insulation, each type
  - 2. Nails and fasteners, each type
- D. Certificates:
  - 1. Indicating type, thickness and thermal conductance of insulation. //(Average thickness for tapered insulation). //
  - 2. Indicating materials and method of application of insulation system on metal decks meet the requirements of Factory Mutual Research Corporation for Class 1 Insulated Steel Deck Roofs.
- E. Laboratory Test Reports: Thermal values of insulation products.
- F. Layout of tapered roof system showing units required.

- G. Documentation of supervisors training and experience showing knowledge of roofing procedures.

#### **1.5 DELIVERY, STORAGE AND MARKING**

- A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer or seller.
- B. Keep materials dry, and store in dry, weather tight facilities or under canvas tarps. Use of polyethylene or plastic tarps to cover materials is not permitted. Store above ground or deck level on wood pallets. Cover ground under stored materials with plastic tarp.
1. Store rolled materials (felts, base sheets, paper) on end. Do not store materials on top of rolled material.
  2. Store foam insulation away from areas where welding is being performed and where contact with open flames is possible.
- C. Protect from damage from handling, weather and construction operations before, during, and after installation.

#### **1.6 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
- C1289-10 .....Faced Rigid Cellular Polyisocynurate Thermal Insulation Board
  - D41-11 .....Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
  - D312-00 (R2006) .....Asphalt Used in Roofing
  - D2178-04 .....Asphalt Glass Felt Used in Roofing and Waterproofing
  - D4586-07 (2012)e1 .....Asphalt Roof Cement, Asbestos-Free
  - D4897-01 (2009) .....Asphalt Coated Glass Fiber Venting Base Sheet
- C. Factory Mutual Global (FM):
- 4450-89 .....Approved Standard for Class 1 Insulated Steel Deck Roofs
- D. National Roofing Contractors Association (NRCA):
- The NRCA Roofing and Waterproofing Manual - Fifth Edition (2009).
- E. Underwriters Laboratories, Inc. (UL):
- Fire Resistance Directory (2009)

**1.7 QUALITY ASSURANCE**

- A. Roof insulation on combustible or steel decks 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, or shall have successfully passed FM Approvals 4450.
- 1. Insulation bearing the UL label and listed in the UL Building Materials Directory as meeting the flame spread and smoke developed ratings will be accepted in-lieu-of copies of test reports.
- 2. 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 particular type used for this project and the construction is listed as fire-classified in the UL Building Materials Directory or listed as Class I roof deck construction in the FM Approvals "RoofNav."
- 3. Insulation tested as part of a roof construction assembly shall bear UL or FM labels attesting to the ratings specified herein.

**PART 2 - PRODUCTS****2.1 ASPHALT MATERIALS**

- A. Primer: ASTM D41.
- B. Asphalt: ASTM D312, Type III or IV for vapor retarders and insulation.
- C. Glass (Felt): ASTM D2178, Type IV, heavy duty ply sheet.
- D. Venting Asphalt Base Sheet: ASTM D4897, Type I or Type II.
- E. Roof Cement: D4586, Type I or Type II.

**2.2 INSULATION**

- A. Isocyanurate Board: ASTM C1289, Type I, Class 2 or Type III.
- B. Tapered Roof Insulation System Segments:
  - 1. Fabricate of isocyanurate. Use only one insulation material for tapered sections.
  - 2. Cut to provide high and low points with crickets and slopes as shown.
  - 3. Minimum thickness of tapered sections; 13 mm (1/2 inch), unless manufacturers allow taper to zero mm (inch).

**2.3 FASTENERS**

- A. Fasteners for securing insulation to steel decks:
  - 1. Conform to requirements of Factory Mutual Research Corporation for wind uplift.
  - 2. Self-drilling galvanized screws with 50 mm (two inch) diameter disk.

3. Antibackout thread design.

4. Have a pullout resistance of 14 kg (30 pounds) minimum.

## **2.4 RECOVERED MATERIALS**

- A. Comply with following minimum content standards for recovered materials:

Material Type	Percent by Weight
Plastic rigid foams: Polyisocyanurate/polyurethane	

- B. The minimum-content standards are based on the weight (not the volume) of the material in the insulating core only.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Do not apply roof insulation if deck will be used for subsequent work platform, storage of materials, or staging or scaffolding will be erected thereon.
- B. Entire roof deck construction of any section of the building shall be completed before insulation system work is begun. Curbs, blocking, edge strips, and other components which insulation, roofing and base flashing is attached to shall be in place ready to receive insulation and roofing. Coordinate roof insulation operations with roofing and sheet metal work so that insulation is installed to permit continuous roofing operations.
- C. Insulation system materials shall be dry and damage free when applied. Do not use broken insulation or insulation with damaged facings. Remove damaged insulation from the site immediately.
- D. Dry out surfaces, including the flutes of metal deck, that become wet from any cause during progress of the work before roofing work is resumed. Apply materials only to dry substrates.
- E. Do not apply materials during damp or rainy weather, during excessive wind conditions, nor while moisture (dew, fog, snow, ice) or frost is present in any amount in or on the materials when temperature is below

10 °C (50 °F). Do not apply materials to substrate having temperature of 10 °C (50 °F) or less.

- F. Phased construction is not permitted. The complete installation of all flashing, insulation, and roofing shall be completed in the same day except for the area where temporary protection is required when work is stopped.

### **3.2 SURFACE PREPARATION**

- A. Sweep decks to broom clean condition. Remove all dust, dirt or debris.
- B. Remove projections that might damage materials.
- C. Existing Roofs:
1. At areas to be altered or repaired, remove loose insulation and wet insulation.
  2. Cut and remove existing insulation and vapor retarder for new work to be installed. Clean cut edges and install a temporary seal to cut surfaces. Use roof cement and one layer of 7 kg (15 pound) felt strip cut to extend 150 mm (6 inches) on each side of cut surface. Bed strip in roof cement and cover strip with roof cement to completely embed the felt.

### **3.3 VAPOR RETARDER**

- A. General:
1. Install a continuous vapor retarder on roof decks as specified.
  2. At vertical surfaces, turn up vapor retarder to top of insulation or base flashing.
  3. At all pipes, walls, and similar penetrations through vapor retarder, seal openings with roof cement to prevent moisture entry from below.
  4. Mop felts solidly in place as specified.
  5. Seal penetrations with roof cement.

### **3.4. INSULATION THICKNESS**

1. Thickness of roof insulation shown on drawings is nominal. Actual thickness shall provide the thermal resistance "R" value of not less than R-19.
2. The minimum thickness of insulation for metal decks shall not be less than recommended by the insulation manufacturer to span the rib opening (flute size) of the metal deck used.
3. When thickness of insulation to be used is more or less than that shown on the drawings, make adjustments in the alignment and

location of roof drains, flashing, gravel stops, fascias and similar items at no additional cost to the Government.

4. Tapered insulation shall be preformed and fabricated to the slopes indicated.
5. Use not less than two layers of insulation when insulation is 25 mm (one inch) or more in thickness unless specified otherwise.

### 3.5 INSTALLATION OF INSULATION

- A. Lay insulating units with close joints, in regular courses and with cross joints broken. When laid in more than one layer, break joints of succeeding layers of roof insulation with those in preceding layer. Bed insulation layers in Type III or IV asphalt firmly pressed into the hot bitumen. Keep bitumen below surface of insulation to receive single ply rubber roofing.
- B. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the roofing felt.
- C. Cover all insulation installed on the same day by either:
  1. The roofing membrane as specified.
  2. Temporary protection as specified.
- D. Seal all cut edges at penetrations and at edges against blocking with bitumen or roof cement.
- E. Cut to fit tight against blocking or penetrations.
- F. Over Vapor Retarder: Lay insulation in hot bitumen as specified.
- G. Steel Deck:
  1. Material and method of application of insulation systems used on metal decks shall meet the requirements of Underwriters laboratories for Class A or Factory Mutual Research Corporation for Class I Insulated Steel Roof Deck.
  2. Mechanically anchor first layer of insulation to steel deck to conform to FM Class 1-90, Insulated Steel Roof Deck.
  3. Locate the long dimension edge joints to have solid bearing on top of deck ribs; do not cantilever over deck rib openings or flutes.

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**SECTION 07 27 27**  
**FLUID-APPLIED MEMBRANE AIR BARRIERS, VAPOR RETARDING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Fluid-applied vapor-retarding air barrier at exterior above grade wall assemblies.

**1.2 RELATED REQUIREMENTS**

- A. Masonry Unit Air Barrier Substrates: Section 04 20 00 UNIT MASONRY.
- B. Flashing Components of Factory Finished Roofing and Wall Systems Air Barriers Requiring Air Barrier Transitions: Division 07 roofing and wall system sections.
- C. Metal Flashing Requiring Air Barrier Transitions: Section 07 60 00 FLASHING AND SHEET METAL.
- D. Joint Sealants: Section 07 92 00 JOINT SEALANTS.
- E. Wall Sheathings Air Barrier Substrates: Section 09 29 00 GYPSUM BOARD.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. Air Barrier Association of America (ABAA):
  1. Quality Assurance Program.
- C. ASTM International (ASTM):
  1. C920-14a - Elastomeric Joint Sealants.
  2. C1193-13 - Use of Joint Sealants.
  3. D412-06a(2013) - Vulcanized Rubber and Thermoplastic Elastomers-Tension.
  4. E84-15a - Surface Burning Characteristics of Building Materials.
  5. E96/E96M-15 - Water Vapor Transmission of Materials.
  6. E2178-13 - Air Permeance of Building Materials.
  7. E2357-11 - Determining Air Leakage of Air Barrier Assemblies.
- D. U.S. Environmental Protection Agency (EPA):
  1. 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Consumer and Commercial Products.

**1.4 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1. Indicate size, configuration, and fabrication and installation details.
- B. Manufacturer's Literature and Data:
  1. Description of each product.
  2. Installation instructions.
- C. Test reports:
  1. Submit field inspection and test reports.
- D. Certificates: Certify each product complies with specifications.
- E. Qualifications: Substantiate qualifications comply with specifications.
  1. Manufacturer with project experience list.
  2. Installer with project experience list.
    - a. Certify installer approval by air barrier manufacturer.
- F. Installation Audit:
  1. Submit audit report.

#### **1.5 QUALITY ASSURANCE**

- A. Coordinate work with adjacent and related work to provide continuous, unbroken, durable air barrier system.
- B. Manufacturer Qualifications:
  1. Regularly and presently manufactures specified products.
  2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
  3. Accreditation by ABAA.
- C. Installer Qualifications:
  1. Regularly and presently installs specified products.
  2. Approved by manufacturer.
  3. Accredited by ABAA.
  4. Applicators certified according to ABAA Quality Assurance Program.
  5. Applicators trained and certified by manufacturer of air barrier system.
  6. Full time on-site field supervisor has completed three projects of similar scope within last year.
  7. Field supervisor accredited by ABAA as Level 3 Accredited Installer.
- D. Testing Agency Qualifications:
  1. Certified perform ABAA Quality Assurance Program installer audits.

2. Staff experienced in installation of specified system and qualified to perform observation and inspection specified and determine compliance with project requirements.

#### **1.6 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

#### **1.7 STORAGE AND HANDLING**

- A. Store products indoors in dry, weathertight, conditioned facility.
- B. Protect products from damage during handling and construction operations.

#### **1.8 FIELD CONDITIONS**

- A. Environment:
  1. Work Area Ambient Temperature Range: 4 to 32 degrees C (40 to 90 degrees F) continuously, beginning 48 hours before installation.
- B. Surface Requirements: visibly dry, and complying with manufacturer's instructions.

#### **1.9 WARRANTY**

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

### **PART 2 - PRODUCTS**

#### **2.1 SYSTEM PERFORMANCE**

- A. Air-Barrier Assembly Air Leakage: Maximum 0.2 L/s/sq. m (0.04 cfm/sq. ft.) of surface area at 75 Pa (1.57 psf) differential pressure when tested according to ASTM E2357.
- B. Provide full system of compatible materials under conditions of service and application required. Compatibility based on testing by material manufacturer.
- C. Perform as continuous vapor retarding air barrier and moisture drainage plane.
- D. Transition to adjacent flashings and discharge water to building exterior.

- E. Accommodate substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without moisture deterioration and air leakage exceeding performance requirements.

## **2.2 PRODUCTS - GENERAL**

- A. Provide air barrier system components from one manufacturer.

## **2.3 AIR BARRIER**

- A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier:
  - 1. Elastomeric, modified bituminous or synthetic polymer membrane.
  - 2. Air Permeance: ASTM E2178: 0.2 L/s/sq. m (0.04 cfm/sq. ft.) of surface area at 75 Pa (1.57 psf) differential pressure.
  - 3. Vapor Permeance: ASTM E96/E96M: Maximum 5.8 ng/Pa/s/sq. m (0.1 perms).
  - 4. Elongation: Ultimate, ASTM D412, Die C: 500 percent, minimum.
  - 5. Thickness: Minimum 1.0 mm (40 mils) dry film thickness, applied in single continuous coat.
  - 6. Surface Burning Characteristics: When tested according to ASTM E84S.
    - a. Flame Spread Rating: 25 maximum.
    - b. Smoke Developed Rating: 450 maximum.

## **2.4 ACCESSORIES**

- A. Primer: Waterborne primer complying with VOC requirements, recommended air barrier manufacturer to suit application.
- B. Counterflashing Sheet: Modified bituminous, minimum 1.0 mm (40 mils) thick, self-adhering composite sheet consisting of minimum 0.8 mm (33 mils) of rubberized asphalt laminated to polyethylene film.
- C. Substrate Patching Material: Manufacturer's standard trowel-grade filler material.
- D. Sprayed Polyurethane Foam Sealant: Foamed-in-place, 24 to 32 kg/cu. m (1.5 to 2.0 pcf) density, with maximum flame-spread index of 25 when tested according to ASTM E84.
- E. Flexible Opening Transition: Cured low-modulus silicone extrusion with reinforcing ribs, sized to fit opening widths, designed for adhesion to or insertion into aluminum framing extrusions, and compatible with air barrier system materials and accessories.

- F. Joint Sealant: ASTM C920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, approved by membrane air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Correct substrate deficiencies:
  - 1. Remove projections and excess materials and fill voids with substrate patching material.
  - 2. Remove contaminants capable of affecting subsequently installed product's performance.
- D. Prepare and treat substrate joints and cracks according to ASTM C1193 and membrane air barrier manufacturer's instructions.

#### **3.2 INSTALLATION - AIR BARRIER**

- A. Install products according to manufacturer's instructions and approved submittals drawings.
  - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install air barrier components according to requirements of ABAA Quality Assurance Program.
- C. Apply primer.
- D. Install transition strips and accessory materials.
- E. Seal air barrier to adjacent components of building air barrier system.
- F. Install flexible opening transition at each opening perimeter. Extend transition onto each substrate minimum 75 mm (3 inches).
  - 1. Fill gaps at perimeter of openings with foam sealant.
- G. At penetrations, seal transition strips around penetrating objects with termination mastic.
  - 1. Fill gaps at perimeter of penetrations with sprayed polyurethane foam sealant.
- H. At top of through-wall flashings, seal with continuous transition strip of manufacturer's recommended material to suit application.

- I. Apply air barrier in full contact with substrate to produce continuous seal with transitions.
- J. Apply fluid membrane in thickness recommended by manufacturer, and minimum specified thickness.
- K. Leave air barrier exposed until tested and inspected and tested by Contracting Officer's Representative.

### **3.3 CLEANING**

- A. Remove masking materials.
- B. Clean spills and overspray using cleaning agents recommended by manufacturers of affected construction.

### **3.4 PROTECTION**

- A. Protect air barrier from construction operations.
- B. Protect air barrier from exposure to UV light exposure exceeding manufacturer's recommendation.
- C. Replace overexposed materials and retest.

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**SECTION 07 41 13  
STANDING SEAM METAL ROOFING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the installation of pre-formed standing seam roofing panels with snap together seam, metal fascia, and soffit panels.

**1.2 RELATED WORK**

- A. Sealant: Section 07 92 00, JOINT SEALANTS.  
B. Flashing and Trim: 07 60 00, FLASHING AND SHEET METAL.

**1.3 DESIGN REQUIREMENTS**

- A. Provide panels in continuous lengths up to manufacturer's standard longest lengths, with no joints or seams, except where indicated or specified. Ribs of adjoining sheets must be in continuous contact from eave to ridge.
- B. There cannot be exposed or penetrating fasteners except where shown on approved shop drawings. Fasteners must be stainless steel, self-taping screws inserted into predrilled holes.
- C. Snap together type systems must have a capillary break and a positive side lap locking device. Include a continuous factory applied sealant within the seam.
- D. Roof panel anchor clips must be concealed and designed to allow for longitudinal thermal movement of the panels, except where specific fixed points are indicated. Provide for lateral thermal movement in panel configuration or with clips designed for lateral and longitudinal movement.
- E. Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
1. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E1592.
2. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class; design and size components to withstand positive and negative wind loads, including

increased loads at building corners as calculated according to local jurisdiction and ASCE 7.

3. Deflection: Provide panels capable of supporting design loads between unsupported spans with deflection of not greater than  $L/180$  of the span.

- F. Single Source: Roofing panels, clips, closures, and other accessories must be standard products of the same manufacturer; be the latest design by the manufacturer; and have been designed by the manufacturer to operate as a complete system for the intended use.
- G. Energy Performance, Energy Star: Provide roofing finish system that is listed on DOE's ENERGY STAR "Roof Products Qualified Product List" or listed on Cool Roof Rating Council (CRRC) product list.

#### **1.4 INSTALLATION REQUIREMENTS**

- A. Pre-Installation Conference: Convene a meeting on site, after submittals are received and approved but before any work, to review drawings and specifications, submittals, schedule, manufacturer instructions, site logistics and pertinent matters of coordination, temporary protection, governing regulations, tests and inspections; participants to include RE/COR and all parties whose work is effected or related to the work of this section.
- B. Install in accordance with SMACNA Architectural Sheet Metal Manual except as otherwise shown or specified.

#### **1.5 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Show design, details of construction, flashing, and fastenings.
- C. Provide design calculations prepared by a professional engineer specializing in structural engineering verifying that system supplied and any additional framing meets design load criteria indicated. Coordinate calculations with manufacturer's test results. Include calculations for:
  1. Wind load uplift design pressure at roof locations.
  2. Clip spacing and allowable load per clip.
  3. Fastening of clips to structure or intermediate supports.



4. Intermediate support spacing and framing and fastening to structure when required.
  5. Allowable panel span at anchorage spacing indicated.
  6. Safety factor used in design loading.
  7. Governing code requirements or criteria.
  8. Edge and termination details.
- D. Installer Qualifications: Document installer is factory-trained, approved by the metal roofing system manufacturer to install the system, and has a minimum of three years' experience as an approved applicator with that manufacturer. The applicator must have applied five installations of similar size and scope as this project within the previous 3 years.

#### **1.6 WARRANTY**

- A. Roofing work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend the warranty period to 30 years.

#### **1.7 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. C920-11 Elastomeric Joint Sealants
  2. E1592 Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
- B. American Society of Civil Engineers (ASCE):
1. ASCE 7-10 Minimum Design Loads for Buildings and Other Structures
- C. Cool Roof Rating Council (CRR):
1. CRR-1-10 Product Rating Program, [www.coolroofs.org](http://www.coolroofs.org)
- D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual 2012
- E. Underwriters Laboratory (UL):
1. UL 580, 2006 Edition Tests for Uplift Resistance of Roof Assemblies
- F. U.S. Department of Energy (DoE):
1. Roof Products Qualified Product List, [www.energystar.gov](http://www.energystar.gov)

**PART 2 - PRODUCTS****2.1 METAL ROOF PANEL**

- A. Zinc Sheet: 99 percent electrolytic high-grade zinc with protective coating on back.
- B. Factory formed metal roof panels designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated, and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for a weathertight installation.
- C. Vertical rib, snap joint, standing seam metal roof panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels and snapping panels together.
- D. Panel Coverage: 406 mm (16 inches).
- E. Seam Height: Minimum 44 mm (1-3/4 inch).

**2.2 FASCIAS AND SOFFITS**

- A. Provide same materials as roof, in profiles indicated on the Drawings.

**2.3 SEALANTS**

- A. Field-applied: ASTM C920.
- B. Seam Cap Sealant: Factory applied hot melt, high viscosity, pressure sensitive adhesive with high heat resistance.
- C. Type, Grade, and Class as recommended in writing by the manufacturer.

**2.4 SEALANT TAPE**

- A. Pressure sensitive, 100 percent solids, Gray Polyisobutylene compound with release-paper backing.
- B. 12 mm (1/2 inch) wide x 3 mm (1/8 inch) thick.

**2.5 UNDERLAYMENT**

- A. Self-Adhering with reinforcing scrim, High-Temperature Sheet: Minimum 50 thick minimum, consisting of slip-resisting top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied.

**2.6 FASTENERS**

- A. Self-drilling, or self-tapping stainless steel fasteners.

- B. Concealed Standard Anchor Clips: Stainless steel. Clips must be two (2) piece design; one-piece clips are not acceptable.

## **2.7 FINISHES**

- A. Color: As indicated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.
  - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B. Install fascia and trim.

### **3.3 METAL ROOF PANEL INSTALLATION, GENERAL**

- A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Field cutting of metal roof panels by torch is not permitted.
  - 2. Install panels perpendicular to purlins.
  - 3. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction; predrill panels.
  - 4. Provide metal closures at peaks, rake walls and each side of ridge and hip caps.

5. Flash and seal metal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
6. Locate and space fastenings in uniform vertical and horizontal alignment.
7. Install ridge and hip caps as metal roof panel work proceeds.
8. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
9. Lap metal flashing over metal roof panels to allow moisture to run over and off the material.

B. Fasteners:

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.

### **3.4 FIELD-ASSEMBLED METAL ROOF PANEL INSTALLATION**

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. //Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.//

4. //Form field-formed seam type system seams in the field with an automatic mechanical seamer approved by the manufacturer.//

### **3.5 ACCESSORY INSTALLATION**

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
  1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  2. Details of installation which are not indicated must be in accordance with the SMACNA, panel manufacturer's approved printed instructions and details, or the approved shop drawings. Allow for expansion and contraction of flashing.
- B. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

### **3.6 ERECTION TOLERANCES**

- A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 6 mm in 6 m (1/4 inch in 20 feet) on slope and location lines as indicated and within 3 mm (1/8 inch) offset of adjoining faces and of alignment of matching profiles.

### **3.7 CLEANING AND PROTECTION**

- A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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**SECTION 07 54 19**  
**POLYVINYL-CHLORIDE (PVC) ROOFING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Polyvinyl chloride (PVC) sheet roofing adhered to insulated metal roof deck.

**1.2 RELATED REQUIREMENTS**

- A. Vapor Retarder, and Roof Insulation: Section 07 22 00, ROOF AND DECK INSULATION.
- B. Roof Membrane Color: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
  1. FX-1-01(R2006) - Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
  2. RP-4 2013 - Wind Design Standard for Ballasted Single-ply Roofing Systems.
- C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
  1. 7-10 - Minimum Design Loads for Buildings and Other Structures.
- D. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):
  1. 90.1-13 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- E. ASTM International (ASTM):
  1. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
  2. C140/C140M-15 - Sampling and Testing Concrete Masonry Units and Related Units.
  3. C936/C936M-15 - Solid Concrete Interlocking Paving Units.
  4. C1371-15 - Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
  5. C1549-09(2014) - Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.

6. D1876-08(2015)e1 - Peel Resistance of Adhesives (T-Peel Test).
  7. D4263-83(2012) - Indicating Moisture in Concrete by the Plastic Sheet Method.
  8. D4434/D4434M-12 - Poly (Vinyl Chloride) Sheet Roofing.
  9. E96/E96M-15 - Water Vapor Transmission of Materials.
  10. E408-13 - Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
  11. E1918-06(2015) - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
  12. E1980-11 - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
- F. Cool Roof Rating Council (CRRC):
1. 1-15 - Product Rating Program.
- G. National Roofing Contractors Association (NRCA):
1. Manual-15 - The NRCA Roofing Manual: Membrane Roofing Systems.
- H. U.S. Department of Agriculture (USDA): USDA BioPreferred Catalog.
- I. UL LLC (UL):
1. 580-06 - Tests for Uplift Resistance of Roof Assemblies.
  2. 1897-15 - Uplift Tests for Roof Covering Systems.
- J. U.S. Department of Commerce National Institute of Standards and Technology (NIST):
1. DOC PS 1-09 - Structural Plywood.
  2. DOC PS 2-04 - Performance Standard for Wood-Based Structural-Use Panels.
- K. U.S. Environmental Protection Agency (EPA):

#### **1.4 PREINSTALLATION MEETINGS**

- A. Conduct preinstallation meeting at the Project site minimum 30 days before beginning Work of this section.
1. Required Participants:
    - a. Contracting Officer's Representative.
    - b. Architect/Engineer.
    - c. Inspection and Testing Agency.
    - d. Contractor.
    - e. Installer.
    - f. Manufacturer's field representative.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
  - a. Installation schedule.
  - b. Installation sequence.
  - c. Preparatory work.
  - d. Protection before, during, and after installation.
  - e. Installation.
  - f. Terminations.
  - g. Transitions and connections to other work.
  - h. Inspecting and testing.
  - i. Other items affecting successful completion.
  - j. Pull out test of fasteners.
  - k. Material storage, including roof deck load limitations.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

#### **1.5 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
  1. Roofing membrane layout.
  2. Roofing membrane seaming and joint details.
  3. Roof membrane penetration details.
  4. Base flashing and termination details.
  5. Paver layout.
  6. Paver anchoring locations and details.
- C. Manufacturer's Literature and Data:
  1. Description of each product.
  2. Minimum fastener pull out resistance.
  3. Installation instructions.
  4. Warranty.
  5. Product Data for Federally-Mandated Bio-Based Materials: For roof materials, indicating USDA designation and compliance with definitions for bio-based products, Rapidly Renewable Materials, and certified sustainable wood content.
- D. Samples:
  1. Roofing Membrane: 150 mm (6 inch) square.



2. Base Flashing: 150 mm (6 inch) square.
3. Fasteners: Each type.
4. Roofing Membrane Seam: 300 mm (12 inches) square.
- E. Certificates: Certify products comply with specifications.
  1. Fire and windstorm classification.
  2. Energy performance requirements.
- F. Qualifications: Substantiate qualifications comply with specifications.
  1. Installer, including supervisors with project experience list.
  2. Manufacturer's field representative with project experience list.
- G. Field quality control reports.
- H. Temporary protection plan. Include list of proposed temporary materials.
- I. Operation and Maintenance Data:
  1. Maintenance manuals.

#### **1.6 QUALITY ASSURANCE**

- A. Installer Qualifications:
  1. Approved by roofing system manufacturer as installer for roofing system with specified warranty.
  2. Regularly installs specified products.
  3. Installed specified products with satisfactory service on five similar installations for minimum five years.
    - a. Project Experience List: Provide contact names and addresses for completed projects.
  4. Employs full-time supervisors experienced installing specified system and able to communicate with Contracting Officer's Representative and installer's personnel.
- B. Manufacturer's Field Representative:
  1. Manufacturer's full-time technical employee or independent roofing inspector.
  2. Individual certified by Roof Consultants Institute as Registered Roof Observer.

#### **1.7 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.

- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

#### **1.8 STORAGE AND HANDLING**

- A. Comply with NRCA Manual storage and handling requirements.
- B. Store products indoors in dry, weathertight facility.
- C. Store adhesives according to manufacturer's instructions.
- D. Protect products from damage during handling and construction operations.
- E. Products stored on the roof deck must not cause permanent deck deflection.

#### **1.9 FIELD CONDITIONS**

- A. Environment:
  - 1. Product Temperature: Minimum 4 degrees C (40 degrees F) and rising before installation.
  - 2. Weather Limitations: Install roofing only during dry current and forecasted weather conditions.

#### **1.10 WARRANTY**

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant roofing system against material and manufacturing defects and agree to repair any leak caused by a defect in the roofing system materials or workmanship of the installer.
  - 1. Warranty Period: 20 years.

### **PART 2 - PRODUCTS**

#### **2.1 SYSTEM DESCRIPTION**

- A. Roofing System: Adhered roofing membrane, base flashing, roof insulation, fasteners, substrate boards, copings, and edge metal.

#### **2.2 SYSTEM PERFORMANCE**

- A. Design roofing system meeting specified performance:
  - 1. Load Resistance: ASCE/SEI 7; Design criteria as indicated on Drawings.
    - a. Uplift Pressures: As indicated on Drawings.
  - 2. Energy Performance:
    - a. EPA Energy Star Listed for low-slope roof products.

- b. ASTM E1980; Minimum 78 Solar Reflectance Index (SRI).
- c. CRRC-1; Minimum 0.70 initial solar reflectance and minimum 0.75 emissivity.
- d. Three-Year Aged Performance: Minimum 0.55 solar reflectance tested in according to ASTM C1549 or ASTM E1918, and minimum 0.75 thermal emittance tested in according to ASTM C1371 or ASTM E408.
  - 1) Where tested aged values are not available:
    - a) Calculate compliance adjusting initial solar reflectance according to ASHRAE 90.1.
    - b) Provide roofing system with minimum 64 three-year aged Solar Reflectance Index calculated according to ASTM E1980 with 12 W/sq. m/degree K (2.1 BTU/h/sq. ft.) convection coefficient.

## **2.3 PRODUCTS - GENERAL**

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide roof system components from one manufacturer.

## **2.4 PVC ROOFING MEMBRANE**

- A. PVC Sheet: ASTM D4434/D4434M, Type II - reinforced.
  - 1. Backing: With fabric backing.
  - 2. Thickness: 1.5 mm (60 mils.
  - 3. Color: See Section 09 06 00, SCHEDULE OF FINISHES.
- B. Additional Properties:
  - 1. Water Vapor Permeance, ASTM E96/E96M: Minimum 8 ng/Pa/s/sq. m (0.14 perms) (Water Method).

## **2.5 SUBSTRATE BOARD**

- A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inch (16 mm) thick.

## **2.6 MEMBRANE ACCESSORY MATERIALS**

- A. Flashing Sheet: Manufacturer's standard; same material, type, reinforcement, thickness, and color as roofing membrane.
- B. Factory Formed Flashings: Inside and outside corners, pipe boots, and other special flashing shapes to minimize field fabrication.
- C. Splice Lap Sealant: Manufacturer's standard for exposed lap edge, matching roof membrane color.

- D. Bonding Adhesive: Manufacturer's standard adhesive to suit substrates.
- E. Termination Bars: Manufacturer's standard, stainless steel or aluminum, 25 mm wide by 3 mm thick (1 inch wide by 1/8 inch thick) factory drilled for fasteners.
- F. Battens: Manufacturer's standard, galvanized or galvanized steel, 25 mm wide by 1.3 mm thick (1 inch wide by 0.05 inch thick) factory punched for fasteners.
- G. Pipe Compression Clamp:
  - 1. Stainless steel drawband.
  - 2. Worm drive clamp device.
- H. Fasteners: Manufacturer's standard coated steel with metal or plastic plates to suit application.
- I. Protection Sheet: UV-resistant fabric and weight recommended by roofing manufacturer for installation under pavers.
- J. Miscellaneous Accessories: Provide other accessories required by manufacturer for complete, watertight installation.

## **2.7 ACCESSORIES**

- A. Temporary Protection Materials:
  - 1. Expanded Polystyrene (EPS) Insulation: ASTM C578.
  - 2. Plywood: NIST DOC PS 1, Grade CD Exposure 1.
  - 3. Oriented Strand Board (OSB): NIST DOC PS 2, Exposure 1.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine and verify substrate suitability for product installation with roofing installer and roofing inspector present.
  - 1. Verify roof penetrations are complete, secured against movement, and firestopped.
  - 2. Verify roof deck is adequately secured to resist wind uplift.
  - 3. Verify roof deck is clean, dry, and in-plane ready to receive roofing system.
- B. Correct unsatisfactory conditions before beginning roofing work.

### **3.2 PREPARATION**

- A. Complete roof deck construction before beginning roofing work:
  - 1. Install curbs, blocking, edge strips, nailers, and other components to which roofing membrane and base flashing are attached.

2. Coordinate roofing membrane installation with flashing work and roof insulation work so insulation and flashing are installed concurrently to permit continuous roofing operations.
  3. Document installation of related materials to be concealed before installing roofing work.
- B. Dry out wet substrate surfaces including roof deck flutes. Apply materials to dry substrates, only.
  - C. Broom clean roof decks. Remove dust, dirt and debris.
  - D. Remove projections capable of damaging roofing materials.

### **3.3 TEMPORARY PROTECTION**

- A. Install temporary protection at end of each day's work, when work is halted indefinitely, and when precipitation is imminent. Comply with approved temporary protection plan.
- B. Install temporary cap flashing over top of base flashings where permanent flashings are not in place to protect against water intrusion into roofing system. Securely anchor in place to prevent blow off and damage by construction activities.
- C. Temporarily seal exposed insulation surfaces within roofing membrane.
  1. Apply temporary seal and water cut off by extending roofing membrane beyond insulation and securely embedding edge of the roofing membrane in 6 mm (1/4 inch) thick by 50 mm (2 inches) wide strip of temporary closure sealant. Weight roofing membrane edge with sandbags, to prevent displacement; space sandbags maximum 2400 mm (8 feet) on center.
  2. Direct water away from work. Provide drainage, preventing water accumulation.
  3. Check daily to ensure temporary seal remains watertight. Reseal open areas and weight down.
- D. Before the work resumes, cut off and discard portions of roof membrane in contact with temporary seal.
  1. Cut minimum 150 mm (6 inches) back from sealed edges and surfaces.
- E. Remove sandbags and store for reuse.

### **3.4 INSTALLATION, GENERAL**

- A. Install products according to manufacturer's instructions and approved submittal drawings.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Comply with NRCA Manual installation requirements.
- C. Comply with UL 580 or UL 1897 for uplift resistance.
- D. Do not allow membrane and flashing to contact surfaces contaminated with asphalt, coal tar, oil, grease, or other substances incompatible with PVC.

### **3.5 ROOFING INSTALLATION**

- A. Install membrane perpendicular to long dimension of insulation boards.
- B. Begin membrane installation at roof low point and work towards high point. Lap membrane shingled in water flow direction.
- C. Position membrane free of buckles and wrinkles.
- D. Roll membrane out; inspect for defects as membrane is unrolled. Remove defective areas.
  1. Allow 30 minutes for membrane to relax before proceeding.
  2. Lap edges and ends minimum 50 mm (2 inches).
  3. Heat weld or solvent weld laps. Apply pressure to develop full adhesion with minimum seam strength according to ASTM D4434/D4434M.
  4. Check seams to ensure continuous adhesion and correct defects.
  5. Finish seam edges beveled bead of sealant.
  6. Finish seams same day as membrane is installed.
  7. Anchor membrane perimeter to roof deck and parapet wall as indicated on drawings.
- E. Adhered System Installation:
  1. Apply bonding adhesive in quantities required by roofing membrane manufacturer.
  2. Fold sheet back on itself after rolling out and coat bottom side of roofing membrane and top substrate with adhesive. Do not coat the lap joint area.
  3. After adhesive has set according to adhesive manufacturer's instructions, roll roofing membrane into adhesive minimizing voids and wrinkles.
  4. Repeat for other half of sheet.
  5. Cut voids and wrinkles to lay flat. Clean and patch cut area.
- F. Mechanically Fastened System Installation:

1. Secure roofing membrane to structural deck with fasteners through battens to achieve specified wind uplift performance.
  - a. Drill pilot holes for fasteners installed into cast-in-place concrete. Drill hole minimum 10 mm (3/8 inch) deeper than fastener penetration.
2. When fasteners are installed within membrane laps, locate battens minimum 13 mm (1/2 inch) from edge of sheets.
3. Where fasteners are installed over roofing membrane after seams are welded, cover fasteners with minimum 175 mm (7 inch) diameter PVC membrane cap centered over fasteners. Where battens are used cover batten with minimum 175 mm (7 inch) wide PVC strip centered over batten. Weld cap to roofing membrane and finish edges with lap sealant.

### **3.6 FLASHING INSTALLATION**

- A. Install flashings on same day as roofing membrane is installed. When flashing cannot be completely installed in one day, complete installation until flashing is watertight and provide temporary covers or seals.
- B. Flashing Roof Drains:
  1. Install roof drain flashing according to roofing membrane manufacturer's instruction.
    - a. Install metal drain flashing in asphalt roof cement, holding cement back from edge of metal flange.
    - b. Do not allow roof cement to contact PVC roofing membrane.
    - c. Adhere roofing membrane to metal flashing with bonding adhesive.
  2. Turn metal drain flashing and roofing membrane down into drain body. Install clamping ring and strainer.
- C. Installing Base Flashing and Pipe Flashing:
  1. Install flashing sheet to pipes, walls and curbs to minimum 200 mm (8 inches) height above roof surfaces and extend roofing manufacturer's standard lap dimension onto roofing membranes.
    - a. Adhere flashing with bonding adhesive.
    - b. Form inside and outside corners of flashing sheet according to NRCA Manual.
    - c. Form pipe flashing according to NRCA Manual.
    - d. Lap ends roofing manufacturer's standard dimension.

- e. Weld flashing sheets together, and weld flashing sheets to roofing membranes. Finish exposed edges with lap sealant.
  - 2. Anchor top of flashing to walls and curbs with fasteners spaced maximum 150 mm (6 inches) on center. Use surface mounted fastening strip on ducts. Use pipe clamps on pipes or other round penetrations.
  - 3. Apply sealant to top edge of flashing.
- D. Repairs to Membrane and Flashings:
- 1. Remove sections of roofing membrane and flashing sheets that are creased, wrinkled, or fishmouthed.
  - 2. Cover removed areas, cuts and damaged areas with patch extending 100 mm (4 inches) beyond damaged, cut, or removed area. Weld patch to roofing membrane or flashing sheet. Finish edge of lap with lap sealant.

### **3.7 FIELD QUALITY CONTROL**

- A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
- 1. Fastener Pull Out Tests: ANSI/SPRI FX-1; one test for every 230 sq. m (2,500 sq. ft.) of deck. Perform tests for each combination of fastener type and roof deck type before installing roof insulation.
    - a. Test at locations selected by Contracting Officer's Representative.
    - b. Do not proceed with roofing work when pull out resistance is less than manufacturer's required resistance.
    - c. Test Results:
      - 1) Repeat tests using different fastener type or use additional fasteners achieve pull out resistance required to meet specified wind uplift performance.
      - 2) Patch cementitious deck to repair areas of fastener tests holes.
  - 2. Examine and probe roofing membrane and flashing seams in presence of Contracting Officer's Representative and Manufacturer's field representative.
  - 3. Probe seams to detect marginal welds, voids, skips, and fishmouths.



4. Cut 100 mm (4 inch) wide by 300 mm (12 inch) long samples through seams where directed by Contracting Officer's Representative.
5. Cut one sample for every 450 m (1500 feet) of seams.
6. Cut samples perpendicular to seams.
7. Failure of samples to pass ASTM D1876 test will be cause for rejection of work.
8. Repair areas where samples are taken and where marginal bond, voids, and skips occur.
9. Repair fishmouths and wrinkles by cutting to lay flat. Install patch over cut area extending 100 mm (4 inches) beyond cut.

B. Manufacturer Services:

1. Inspect initial installation, installation in progress, and completed work.
2. Issue supplemental installation instructions necessitated by field conditions.
3. Prepare and submit inspection reports.
4. Certify completed installation complies with manufacturer's instructions and warranty requirements.

### 3.8 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed roofing surfaces. Remove contaminants and stains // to comply with specified solar reflectance performance //.

### 3.9 PROTECTION

- A. Protect roofing system from traffic and construction operations.
  1. Protect roofing system when used for subsequent work platform, materials storage, or staging.
  2. Distribute scaffolding loads to exert maximum 50 percent roofing system materials compressive strength.
- B. Loose lay temporary insulation board overlaid with plywood or OSB.
  1. Weight boards to secure against wind uplift.
- C. Remove protection when directed by Contracting Officer's Representative.
- D. Repair damage.

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**SECTION 07 60 00  
FLASHING AND SHEET METAL**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Formed sheet metal work for wall and roof flashing, and fasciae.

**1.2 RELATED WORK**

- A. Flashing components of factory finished roofing and wall systems:  
Division 07 roofing and wall system sections.
- B. Joint Sealants: Section 07 92 00, JOINT SEALANTS.
- C. Flashing and sheet metal in connection with prefabricated metal  
buildings: Section 13 34 19, METAL BUILDING SYSTEMS.

**1.3 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
1. ANSI/SPRI ES-1-03 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems
- C. ASTM International (ASTM):
1. A167-99(R2009) - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
  2. A653/A653M-09 - Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated (Galvanized) by the Hot-Dip Process
  3. B32-08 - Solder Metal
  4. B209-10 - Aluminum and Aluminum-Alloy Sheet and Plate
  5. B370-09 - Copper Sheet and Strip for Building Construction
  6. D173-03 - Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing
  7. D412-06 - Vulcanized Rubber and Thermoplastic Elastomers-Tension
  8. D1187-97(R2002) - Asphalt Base Emulsions for Use as Protective Coatings for Metal

- 9. D3656-07 - Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns
- 10. D4586-07 - Asphalt Roof Cement, Asbestos Free
- D. International Building Code, Current Edition
- E. National Association of Architectural Metal Manufacturers (NAAMM):
  - 1. AMP 500-06 - Metal Finishes Manual
- F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual 2012

#### **1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: For all specified items, including:
  - 1. Flashings.
  - 2. Expansion joints.
  - 3. Fascia-cant.
- C. Manufacturer's Literature and Data: For all specified items, including:
  - 1. Two-piece counterflashing.
  - 2. Fascia-cant.
- D. Certificates: Indicating compliance with specified finishing requirements, from applicator and contractor.

#### **1.5 PRE-INSTALLATION CONFERENCE**

- A. Convene a meeting on site, after submittals are received and approved but before any work, to review drawings and specifications, submittals, schedule, manufacturer instructions, site logistics and pertinent matters of coordination, temporary protection, governing regulations, tests and inspections; participants to include RE/COR and all parties whose work is effected or related to the work of this section.

### **PART 2 - PRODUCTS**

#### **2.1 FLASHING AND SHEET METAL MATERIALS**

- A. Stainless Steel: ASTM A167, Type 302B, dead soft temper.
- B. Copper ASTM B370, cold-rolled temper.
- C. Galvanized Sheet: ASTM A653.

D. Non-reinforced, Elastomeric Sheetting: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet (0.056 inch) thick.

1. Tensile Strength: Minimum 7 MPa (1,000 psi) tensile strength and not more than seven percent tension-set at 50 percent elongation when tested in accordance with ASTM D412.
2. No cracking or flaking when bent through 180 degrees over a 1 mm (1/32 inch) diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -30°C (-20 °F).

## **2.2 FLASHING ACCESSORIES**

- A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.
- B. Rosin Paper: Sheathing paper, weighing minimum 141 g m<sup>2</sup> (3 lbs/100 sf).
- C. Bituminous Paint: ASTM D1187, Type I.
- D. Fasteners:
  1. Use copper, copper alloy, bronze, brass, or stainless steel for copper and copper clad stainless steel, and stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
  2. Nails:
    - a. Minimum diameter for copper nails: 3 mm (0.109 inch).
    - b. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
    - c. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
  3. Rivets: Not less than 3 mm (1/8 inch) diameter.
- E. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.
- F. Roof Cement: ASTM D4586.

## **2.3 SHEET METAL THICKNESS**

- A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:
- B. Concealed Locations (Built into Construction):

1. Stainless steel: 0.25 mm (0.010 inch) thick.
- C. Exposed Locations:
  1. Copper: 0.4 Kg (16 oz).
- D. Thickness of aluminum or galvanized steel is specified with each item.

## **2.4 FABRICATION, GENERAL**

- A. Jointing:
  1. Lock and solder copper, stainless steel and copper clad stainless steel joints, except expansion and contraction joints.
  2. Jointing of copper over 0.5 Kg (20 oz) weight or stainless steel over 0.45 mm (0.018 inch) thick to be done by lapping, riveting and soldering.
  3. Provide joints conforming to following requirements:
    - a. Finish flat-lock joints not less than 19 mm (3/4 inch) wide.
    - b. Finish lap joints subject to stress not less than 25 mm (one inch) wide; soldered and riveted.
    - c. Finish unsoldered lap joints not less than 100 mm (4 inches) wide.
  4. Make flat and lap joints in direction of flow.
  5. Soldering:
    - a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of uncoated copper, and stainlesssteel.
    - b. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
    - c. Completely remove acid and flux after soldering is completed.
- B. Expansion and Contraction Joints:
  1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
  2. Space joints as shown or as specified.
  3. Space expansion and contraction joints for copper and stainless steel at intervals not exceeding 7200 mm (24 feet).
  4. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
- C. Cleats:

1. Fabricate cleats to secure flashings and sheet metal work over 300 mm (12 inches) wide and where specified.
2. Provide cleats for maximum spacing of 300 mm (12 inch) centers unless specified otherwise.
3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.
4. Fabricate cleats from 50 mm (2 inch) wide strip. Form end with not less than 19 mm (3/4 inch) wide loose lock to item for anchorage. Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

D. Metal Options:

1. Where options are permitted for different metals use only one metal throughout.
2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.

## **2.5 FINISHES**

- A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
- B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.

## **2.6 COUNTERFLASHING (CAP FLASHING OR HOODS)**

- A. Use stainless steel, unless specified otherwise.
- B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip:
  1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
  2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
  3. Two-piece, lock in type flashing may be used instead of one piece counter-flashing.
  4. Manufactured assemblies may be used.
  5. Where counterflashing is installed at new work use an integral flange at the top designed to be extended into the masonry joint or reglet in concrete.

6. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.

C. Two-Piece Counterflashing:

1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 6 mm (1/4 inch) and exposed edge designed to receive and lock counterflashing upper edge when inserted.
2. Counterflashing upper edge designed to snap lock into receiver.

D. Surface Mounted Counterflashing; one or two piece:

1. Use at existing or new surfaces where flashing cannot be inserted in vertical surface.
2. One piece fabricate upper edge folded double for 65 mm (2 1/2 inches) with top 19 mm (3/4 inch) bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 400 mm (16 inch) centers between end holes. Option: One piece surface mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
3. Two pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 400 mm (16 inch) centers between upper and lower edge.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

A. General:

1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
2. Anchor sheet metal flashing and trim and other components of the work securely in place with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants and other miscellaneous items as required, to complete flashing and trim assemblies.

3. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
4. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
5. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
6. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
7. Apply a layer of 7 Kg (15 pound) saturated felt followed by a layer of rosin paper to wood surfaces to be covered with copper. Lap each ply 50 mm (2 inch) with the slope and nail with large headed copper nails.
8. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nails not over 100 mm (4 inches) on center unless specified otherwise.
9. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
10. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
11. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
12. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
13. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
14. two coats of aluminum paint.



### 3.2 COUNTERFLASHING (CAP FLASHING OR HOODS)

#### A. General:

1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

#### B. One Piece Counterflashing:

1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
3. Where flashing is surface mounted on flat surfaces.
  - a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center:
    - 1) Locate fasteners in masonry mortar joints.
    - 2) Use screws to sheet metal or wood.
  - b. Fill joint at top with sealant.
4. Where flashing or hood is mounted on pipe.
  - a. Secure with draw band tight against pipe.
  - b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
  - c. Completely fill joint at top with sealant.

#### C. Two-Piece Counterflashing:

1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
2. Surface applied type receiver:
  - a. Secure to face construction in accordance, with manufacturer's instructions.
  - b. Completely fill space at the top edge of receiver with sealant.
3. Insert counter flashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.
- D. Where vented edge occur install so lower edge of counterflashing is against base flashing.
- E. When counter flashing is a component of other flashing install as shown.

- - - END - - -

**SECTION 07 84 00**  
**FIRESTOPPING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. 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.

1. Through-penetrations include the annular space around pipes, tubes, conduit, wires, cables and vents.
2. Construction joints include those used to accommodate expansion, contraction, wind, or seismic movement; firestopping material cannot interfere with the required movement of the joint.
3. Gaps requiring firestopping include gaps 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.

B. Closure of openings in walls against penetration of gases or smoke in smoke partitions.

**1.2 RELATED WORK**

A. Sealants and application: Section 07 92 00, JOINT SEALANTS.

**1.3 SUBMITTALS**

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. 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 instead of fire-test data or report. For those firestop applications for which no UL tested system is available through a manufacturer, submit a manufacturer's engineering judgment, derived from similar UL system designs or other tests, 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.

- C. Submit certificates attesting that firestopping material complies with the specified requirements. For all intumescent firestop materials used in through penetration systems, manufacturer must provide certification from UL of passing the "Aging and Environmental Exposure Testing" portion of UL 1479.
- D. Submit manufacturer's representative certification stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements. Manufacturer's representative must be a direct employee of the manufacturer (not a distributor or an agent) and be qualified to perform the specified inspections and certify the firestopping installation.

#### **1.4 DELIVERY AND STORAGE**

- A. Deliver materials in their original unopened containers with manufacturer's name and product identification.
- B. Store in a location providing protection from damage and exposure to the elements.

#### **1.5 WARRANTY**

- A. Firestopping work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend the warranty period to five years.

#### **1.6 QUALITY ASSURANCE**

- A. FM, UL, or WH or other approved laboratory tested products will be acceptable.

#### **1.7 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American Society for Testing and Materials (ASTM):
  - 1. E84-12c - Surface Burning Characteristics of Building Materials

2. E814-11a - Fire Tests of Penetration Firestop Systems
  3. E2174-10ae1 - On-Site Inspection of Installed Fire Stops
  4. E2393-10a - On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
- C. FM Global (FM):
1. Annual Issue - Approval Guide Building Materials
- D. Underwriters Laboratories, Inc. (UL):
1. Annual Issue - Building Materials Directory
  2. Annual Issue - Fire Resistance Directory
  3. 1479 - Fire Tests of Through-Penetration Firestops
- E. Warnock Hersey (WH):
1. Annual Issue - Certification Listings

## **1.8 SEQUENCING**

- A. Coordinate the specified work with other trades.
- B. Apply firestopping materials, at penetrations of pipes and ducts, prior to insulating, unless insulation meets requirements specified for firestopping.
- C. Apply firestopping materials at building joints and construction gaps, prior to completion of enclosing walls or assemblies.
- D. Locate and install cast-in-place firestop devices in place before concrete placement. Install pipe, conduit or cable bundles through cast-in-place device after concrete placement but before area is concealed or made inaccessible.
- E. Inspect and receive approval for firestop material prior to final completion and enclosing of any assemblies that may conceal installed firestop.

## **PART 2 - PRODUCTS**

### **2.1 FIRESTOP SYSTEMS**

- A. Use factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke.
- B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating must maintain the same rating and integrity as the fire barrier being

sealed. "T" ratings are not required for penetrations smaller than or equal to 100 mm (4 in) nominal pipe or 0.01 m<sup>2</sup> (16 sq. in.) in overall cross sectional area.

- C. Products requiring heat activation that seal an opening by its intumescence must exhibit a demonstrated ability to function as designed to maintain the fire barrier.
- D. Provide firestop sealants used for firestopping or smoke sealing with the following properties:
  - 1. Contain no flammable or toxic solvents.
  - 2. Have no dangerous or flammable out gassing during the drying or curing of products.
  - 3. Water-resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
  - 4. When used in exposed areas, firestop sealant can be sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.
- E. Provide firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials with following properties:
  - 1. Classified for use with the particular type of penetrating material used.
  - 2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
  - 3. Intumescent products which would expand to seal the opening and act as fire, smoke, toxic fumes, and, water sealant.
- F. Provide products with maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84.
- G. Provide products FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
- H. Materials must be asbestos free.

## **2.2 SMOKE STOPPING IN SMOKE PARTITIONS**

- A. Use silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.
- B. Use mineral fiber filler and bond breaker behind sealant.

- C. Sealants must have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with E84.
- D. When used in exposed areas capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Submit product data and installation instructions, as required by article, submittals, after an on-site examination of areas to receive firestopping.

#### **3.2 PREPARATION**

- A. Remove dirt, grease, oil, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.
- B. Remove insulation on insulated pipe for a distance of 150 mm (6 inches) on either side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

#### **3.3 INSTALLATION**

- A. Do not begin work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.
- B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.
- C. Install smoke stopping seals in smoke partitions.

#### **3.4 INSPECTIONS**

- A. Manufacturer's technical representative to inspect all firestopping in accordance to ASTM standards for firestop inspection, and document inspection results; ASTM E2174 and E2393.

#### **3.5 CLEAN-UP AND ACCEPTANCE OF WORK**

- A. As work on each floor is completed, remove materials, litter, and debris.

- B. Do not move materials and equipment to the next-scheduled work area until completed work is inspected and accepted by the RE/COR; RE/COR inspection does not supersede requirement for inspection by manufacturer's representative or requirements of local jurisdiction.
- C. Clean up spills of liquid type materials.

- - - END - - -



**SECTION 07 92 00  
JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

**1.2 RELATED WORK**

- A. // Sealing of site work concrete paving: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS. //
- B. // Masonry control and expansion joint: Section 04 20 00, UNIT MASONRY. //
- C. // Firestopping penetrations: Section 07 84 00, FIRESTOPPING. //
- D. // Glazing: Section 08 80 00, GLAZING. //
- E. // Sound rated gypsum partitions/sound sealants: Section 09 29 00, GYPSUM BOARD. //
- F. Mechanical Work: Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.

**1.3 QUALITY CONTROL**

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
  - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.

3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.
4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates in accordance with sealant manufacturer's recommendations:

1. Locate test joints where indicated or, if not indicated, as directed by Contracting Officer.
2. Conduct field tests for each application indicated below:
  - a. Each type of elastomeric sealant and joint substrate indicated.
  - b. Each type of non-elastomeric sealant and joint substrate indicated.
3. Notify RE/COR seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint sealant manufacturer's technical representative present. Provide written acceptance from manufacturer's technical representative that materials pass for adhesion and compatibility. /

E. Meet VOC requirements of pertinent CARB and/or SCAQMD Rule for sealants VOC (4 percent by weight VOC or less in less than 16 ounce package or less than 250 g/L in larger package). All non-porous sealant primers must be below 250g/L and primers for porous substrates less than 775 g/L.

F. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution:

1. Joints in mockups of assemblies specified in other sections, that are indicated to receive elastomeric joint sealants, which are specified by reference to this section.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's installation instructions for each product used.
- C. Cured samples of exposed sealants for each color where required to match adjacent material.
- D. Manufacturer's Literature and Data:
  - 1. Caulking compound.
  - 2. Primers.
  - 3. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

**1.5 PROJECT CONDITIONS**

- A. Environmental Limitations:
  - 1. Do not proceed with installation of joint sealants under following conditions:
    - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C (40 degrees F).
    - b. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

**1.6 DELIVERY, HANDLING, AND STORAGE**

- A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.
- B. Carefully handle and store to prevent inclusion of foreign materials.
- C. Do not subject to sustained temperatures less than 5 degrees C (40 degrees F) or exceeding 32 degrees C (90 degrees F).

**1.7 DEFINITIONS**

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Back-up Rod: A type of sealant backing.

C. Bond Breakers: A type of sealant backing.

D. Filler: A sealant backing used behind a back-up rod.

E. SCAQMD: South Coast Air Quality Management District.

#### **1.8 WARRANTY**

A. Warranty exterior sealing against leaks, adhesion, and cohesive failure, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period to be extended to five (5) years.

B. General Warranty: Special warranty specified in this Article will not deprive Government of other rights Government may have under other provisions of Contract Documents and are in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

#### **1.9 APPLICABLE PUBLICATIONS**

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

B. American Society for Testing and Materials (ASTM):

1. C509-06 - Elastomeric Cellular Preformed Gasket and Sealing Material.
2. C612-10 - Mineral Fiber Block and Board Thermal Insulation
3. C717-12b - Standard Terminology of Building Seals and Sealants
4. C734-06(2012) - Low Temperature Flexibility of Latex Sealants after Artificial Weathering
5. C834-10 - Latex Sealants
6. C919-12 - Use of Sealants in Acoustical Applications
7. C920-11 - Elastomeric Joint Sealants
8. C1021-08 - Laboratories Engaged in Testing of Building Sealants
9. C1193-13 - Use of Joint Sealants
10. C1330-02(2013) - Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants
11. D217-10 - Cone Penetration of Lubricating Grease
12. D1056-07 - Flexible Cellular Materials—Sponge or Expanded Rubber

13. E84-12c - Surface Burning Characteristics of Building Materials

C. California Air Resources Board (CARB)

D. South Coast Air Quality Management District (SCAQMD)

E. Sealant, Waterproofing and Restoration Institute (SWRI):

1. The Professionals' Guide

**PART 2 - PRODUCTS**

**2.1 SEALANTS**

A. S-1:

1. ASTM C920, polyurethane.
2. Type M.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 20-40.

B. S-3:

1. ASTM C920, polyurethane.
2. Type S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-25.
6. Minimum elongation of 700 percent.

C. S-4:

1. ASTM C920 polyurethane.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-40.

D. S-5: Not Used

E. S-6:

1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class: Joint movement range of plus 100 percent to minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-20.

F. S-7: Not Used

G. S-8: Not Used

H. S-9:

1. ASTM C920 silicone.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Non-yellowing, mildew resistant.

I. S-10: Not Used

J. S-11:

1. ASTM C920 polyurethane.
2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 35 to 50.

K. S-12:

1. ASTM C920, polyurethane.
2. Type M/S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade P/NS.
5. Shore A hardness of 25 to 50.

## **2.2 CAULKING COMPOUND**

A. C-1: ASTM C834, acrylic latex.

B. C-2: Polymer-based acoustical sealant conforming to ASTM C919 must have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E84. Acoustical sealant must have a consistency of 250 to 310 when tested in accordance with ASTM D217, and must remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C734, and must be non-staining.

## **2.3 COLOR**

A. Match color of mortar joints at exposed masonry.

B. Match color of adjacent concrete at unpainted concrete.

C. Provide light gray or aluminum, unless specified otherwise, for other locations.

D. Provide light gray or white caulking, unless specified otherwise.

#### **2.4 JOINT SEALANT BACKING**

A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type C: Closed-cell material with a surface skin.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

#### **2.5 FILLER**

A. Mineral fiber board: ASTM C612, Type IVA.

B. Closed Cell Neoprene: ASTM D1056.

C. Thickness same as joint width.

D. Depth to fill void completely behind back-up rod.

#### **2.6 PRIMER**

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

#### **2.7 CLEANERS-NON POURIOUS SURFACES**

A. Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous

surfaces and formulated to promote adhesion of sealant and substrates.

### **PART 3 - EXECUTION**

#### **3.1 INSPECTION**

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

#### **3.2 PREPARATIONS**

- A. Prepare joints in accordance with manufacturer's instructions and as specified only when installers are ready to initiate sealant application as soon as practicable after preparation and before subsequent surface deterioration.
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
  - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
  - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.



- d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.
  - 1. Apply primer prior to installation of back-up rod or bond breaker tape.
  - 2. Use brush or other approved means that will reach all parts of joints.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

### **3.3 BACKING INSTALLATION**

- A. Install back-up material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.
- D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.
- E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

### **3.4 SEALANT DEPTHS AND GEOMETRY**

- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
- B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

### 3.5 INSTALLATION

#### A. General:

1. Comply with manufacturer's written installation instructions for products and applications indicated.
2. Test sealants for compatibility with each other and substrate. Use only compatible sealants.
3. Apply sealants and caulking only when ambient temperature is between 5° C and 38° C (40° and 100° F).
4. Do not use polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
5. Do not use sealant type listed by manufacturer as not suitable for use in locations specified.
6. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
7. Avoid dropping or smearing compound on adjacent surfaces.
8. Fill joints solidly with compound and finish compound smooth.
9. Tool joints to concave surface unless shown or specified otherwise.
10. Finish paving or horizontal joints flush unless joint is otherwise detailed.
11. Apply compounds with nozzle size to fit joint width.

B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.

C. Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.

1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.

4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

### 3.6 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as recommended by sealant manufacturer:
  1. Extent of Testing: Test completed elastomeric sealant joints as follows:
    - a. Perform 10 test for first 300 meters (1000 feet) of joint length for each type of elastomeric sealant and joint substrate.
    - b. Perform 10 test for first 300 meters (1000 feet) of joint length thereafter or one test per each floor per elevation.
- A. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
  2. Inspect tested joints and report on following:
  3. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
  4. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
  5. Whether sealants filled joint cavities and are free from voids.
  6. Whether sealant dimensions and configurations comply with specified requirements.
- B. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

- C. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- D. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### **3.7 CLEANING**

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by the caulking or sealant manufacturer.
- B. After filling and finishing joints, remove masking tape.
- C. Leave adjacent surfaces in a clean and unstained condition.

### **3.8 PROTECTION**

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### **3.9 LOCATIONS**

- A. Exterior Building Joints, Horizontal and Vertical:
  - 1. Metal to Metal: Type S-6.
  - 2. Metal to Masonry or Stone: Type S-1.
  - 3. Masonry to Masonry or Stone: Type S-1.
  - 4. Stone to Stone: Type S-1.
  - 5. Cast Stone to Cast Stone: Type S-1.
  - 6. Threshold Setting Bed: Type S-1, S-3, S-4.
  - 7. Masonry Expansion and Control Joints: Type S-6.
  - 8. Wood to Masonry: Type S-1.
- B. Metal Reglets and Flashings:

1. Flashings to Wall: Type S-6.

2. Metal to Metal: Type S-6.

C. Sanitary Joints:

1. Walls to Plumbing Fixtures: Type S-9.

2. Counter Tops to Walls: Type S-9.

3. Pipe Penetrations: Type S-9.

D. Horizontal Traffic Joints:

1. Concrete Paving, Unit Pavers: Type S-11 or S-12.

E. Interior Caulking:

1. Typical Narrow Joint 6 mm, (1/4 inch) or less at Walls and Adjacent Components: Types C-1, C-2 and C-3.

2. Perimeter of Doors, Windows, Access Panels which Adjoin Concrete or Masonry Surfaces: Types C-1, C-2 and C-3.

3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types C-1, C-2 and C-3.

4. Exposed Isolation Joints at Top of Full Height Walls: Types C-1, C-2 and C-3.

5. Exposed Acoustical Joint at Sound Rated Partitions: Type C-2.

6. Concealed Acoustic Sealant Type: S-4, C-1, C-2 and C-3.

- - - END - - -

**SECTION 08 11 13  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies steel doors, steel frames and related components.
- B. Terms relating to steel doors and frames as defined in ANSI/SDI A250.7 and as specified.

**1.2 RELATED WORK**

- A. Frames fabricated of structural steel: Section 05 50 00, METAL FABRICATIONS.
- B. Door Hardware: Section 08 71 00, DOOR HARDWARE.

**1.3 TESTING**

- A. Perform testing with an independent testing laboratory.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers Literature and Data:
  - 1. Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
  - 2. Fire rated doors and frames, showing conformance with NFPA 80 and Underwriters Laboratory, Inc., or Intertek Testing Services or Factory Mutual fire rating requirements.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- D. Schedule: Provide a schedule prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on drawings; coordinate with final door hardware schedule.

**1.5 SHIPMENT**

- A. Prior to shipment label each door and frame to show location, size, door swing and other pertinent information.

- B. Fasten temporary steel spreaders across the bottom of each door frame.

#### **1.6 STORAGE AND HANDLING**

- A. Store doors and frames at the site under cover.
- B. Protect from rust and damage during storage and erection until completion.

#### **1.7 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American Society for Testing and Materials (ASTM):
  - 1. A653/A653M-11 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 2. A1008/A1008M-12a - Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardened
  - 3. C665-12 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
  - 4. E136-12 - Behavior of Materials in a Vertical Tube Furnace at 750 degrees C
- C. Builders Hardware Manufacturers Association (BHMA):
  - 1. ANSI/BHMA A156.115-06 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames
- D. Steel Door Institute (SDI):
  - 1. ANSI/SDI A250.6-03(R09) - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
  - 2. ANSI/SDI A250.7-1997 - Nomenclature for Standard Steel Doors and Steel Frames
  - 3. ANSI/SDI A250.8-03(R08) - Recommended Specifications for Standard Steel Doors and Frames
  - 4. ANSI/SDI A250.11-2012 - Recommended Erection Instructions for Steel Frames

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Metallic-Coated Steel Sheet: ASTM A653, Commercial Steel (CS), Type B.
- B. Sheet Steel: ASTM A1008, cold-rolled for panels (face sheets) of doors.
- C. Anchors, Fastenings and Accessories: Fastenings anchors, clips connecting members and sleeves from zinc coated steel.
- D. Prime Paint: Paint that meets or exceeds the requirements of A250.8.
- E. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

**2.2 FABRICATION GENERAL**

- A. General:
  - 1. Follow ANSI A250.8 for fabrication of steel doors, except as specified otherwise. Doors to receive hardware specified in Section 08 71 00, DOOR HARDWARE. Tolerances must comply to SDI A250.8. Thickness, 44 mm (1-3/4 inches), unless otherwise shown.
  - 2. Close top edge of exterior doors flush and seal to prevent water intrusion.
  - 3. When vertical steel stiffeners are used for core construction, fill spaces between stiffeners with mineral fiber insulation.

**2.3 CLASSIFICATION AND PERFORMANCE**

- A. Standard Duty Doors: ANSI/SDI A250.8, Level 1, physical performance Level C, Model 2, of size(s) and design(s) indicated and core construction as required by the manufacturer.
  - 1. Provide where indicated.
- B. Heavy Duty Doors: ANSI/SDI A250.8, Level 2, physical performance Level B, Model 2, with core construction as required by the manufacturer for exterior doors, of size(s) and design(s) indicated. //
  - 1. Where vertical stiffener cores are required, the space between the stiffeners to be filled with mineral board insulation.
  - 2. Provide Level 2 where indicated.



## 2.4 METAL FRAMES

A. SDI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.

1. Frames for exterior doors: Fabricate from 1.7 mm (0.067 inch) thick galvanized steel conforming to ASTM A525.
2. Type: Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets; grind welds smooth.

B. Reinforcement and Covers:

1. ANSI/SDI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.
2. Comply with applicable requirements in ANSI/SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

C. Two Piece Frames:

1. One piece unequal leg finished rough buck sub-frames as shown, drilled for anchor bolts.
2. Unequal leg finished frames formed to fit sub-frames and secured to sub-frame legs with countersunk, flat head screws, spaced 300 mm (12 inches) on center at head and jams on each side.
3. Preassemble at factory for alignment.

D. Anchors: Provide anchors to secure the frame to adjoining construction; steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 1.2 mm thick (18 gage).

1. Wall Anchors: Provide at least three anchors for each jamb. For frames which are more than 2285 mm (7.5 feet) in height, provide one additional anchor for each jamb for each additional 760 mm (2.5 feet) or fraction thereof.
  - a. Masonry: Provide anchors of corrugated or perforated steel straps or 5 mm (3/16 inch) diameter steel wire; adjustable or T-shaped.
  - b. Stud partitions: Weld or otherwise securely fasten anchors to backs of frames. Design anchors to be fastened// to wood studs with nails, // to closed steel studs with sheet metal screws, and to open steel studs by wiring or welding //.
2. Floor Anchors: Provide floor anchors drilled for 10 mm (3/8 inch) anchor bolts at bottom of each jamb member. // Where floor

fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs. //

## **2.5 LOUVERS**

- A. Interior Louvers: Stationary sightproof type
  - 1. Provide detachable moldings on room or non-security side of door; on security side of door, moldings to be integral part of louver.
  - 2. Form louver frames of 0.9 mm thick (20 gage) steel and louver blades of a minimum 0.6 mm (24 gage).
  - 3. Sightproof louvers to be inverted "V" blade design with minimum 55.

## **2.6 HARDWARE PREPARATION**

- A. Provide minimum hardware reinforcing gages as specified in SDI A250.6.
- B. Drill and tap doors and frames to receive finish hardware.
- C. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI A250.8 and SDI A250.6; for additional requirements refer to ANSI/BHMA A156.115.
- D. Drill and tap for surface-applied hardware at the project site.
- E. Build additional reinforcing for surface-applied hardware into the door at the factory.
- F. Punch door frames, with the exception of frames that will have weatherstripping or gasketing, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors; set lock strikes out to provide clearance for silencers.

## **2.7 SHOP PAINTING**

- A. ANSI/SDI A250.8.

## **2.8 CUSTOM PRE-FINISHED DOORS AND FRAMES AT COMMITTEE SHELTER**

- A. Design: Matching or exceeding quality of 5000 Series Swinging Steel Doors manufactured by Hope's Windows, Inc., Jamestown, NY.
- B. Manufacture door and frames from 12 gauge steel.
- C. True Divided Lite Muntins:
  - 1. Manufacture Tee muntins to size determined by design.

2. Glazing rebate surfaces must be perpendicular to the stem of this section; rebate surfaces that are tapered will not be acceptable.
- D. Glazing Beads: Extruded aluminum Alloy 6063-T5 with a minimum thickness of 0.062 inches.
- E. Provide reinforcements of 10 or 12 gage to suit specified hardware.
- F. All screws to be stainless steel, except glazing bead screws to be plated steel.
- G. Factory-applied Finish: Electrodeposited epoxy primer and intermediate coats followed by baked polyurethane finish; combined overall finish thickness not less than 4.3 mils.
- H. Operable Hardware:
  1. Hinges: Full mortise, heavy duty bronze ball-bearing 4-1/2 x 4-1/2 x 0.180 or heavier as required.
  2. Mortise locks with lever handles, thumb turn and key cylinder.
  3. Top and bottom flush bolts with coordinated socket embeds, to maintain doors closed or open.
- I. Fabrication:
  1. Fabricate steel doors in accordance with approved shop drawings.
  2. Perimeter frame corners must be coped and fully welded for maximum strength and weather tightness with face welds dressed smooth.
  3. Head and jamb door stops to be an integral portion of the frame.
  4. Door leaves must have top and bottom rails coped and welded to the jamb stiles.
  5. Doors and door frames to be mortised, reinforced, drilled and tapped to receive specified mortised hardware; reinforce only for specified surface hardware for which drilling and tapping is performed in the field.
  6. Weld true divided lite muntins to the perimeter frame. Provide muntin intersections slotted, cross notched and welded. Face weld and grind smooth interior and exterior muntin joints.
  7. Provide anchoring at each hinge for maximum support.
  8. Provide replaceable continuous snap-in glazing beads to suit the glass as specified; cut and shop fit glazing beads to each glass lite prior to shipment.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Plumb, align and brace frames securely until permanent anchors are set, in accordance with SDI A250.11.
  - 1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.
  - 2. Use wood spreaders at bottom of frame if the shipping spreader is removed.
  - 3. Protect frame from accidental abuse.
  - 4. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored.
  - 5. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.
- B. Floor Anchors:
  - 1. Anchor the bottom of door frames to floor with two 6 mm (1/4 inch) diameter expansion bolts.
  - 2. Power actuated drive pins may be used to secure frame anchors to concrete floors.
- C. Jamb Anchors:
  - 1. Anchors in Masonry Walls: Embed anchors in mortar. Fill space between frame and masonry wall with grout or mortar as walls are built.
  - 2. // Coat frame back with a bituminous coating prior to lining of grout filling in masonry walls.
  - 3. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.
  - 4. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 6 mm (1/4 inch) expansion bolts through spacers. Where sub-frames or rough bucks are used, 6 mm (1/4 inch) expansion bolts on 600 mm (24 inch) centers or power activated drive pins 600 mm (24 inches) on centers. Secure two piece frames to sub-frame or rough buck with machine screws on both faces.
- D. Install anchors for labeled fire rated doors to provide rating as required.

- E. Hang doors in accordance with clearances specified in SDI/DOOR A250.8.

### **3.2 INSTALLATION OF HARDWARE**

- A. Install hardware as specified in this Section and Section 08 71 00, DOOR HARDWARE.
- B. After erection and glazing, clean and adjust hardware.

- - - END - - -

**SECTION 08 71 00  
DOOR HARDWARE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. Door hardware and related items necessary for complete installation and operation of doors.

**1.2 RELATED WORK**

A. Caulking: Section 07 92 00, JOINT SEALANTS.

B. Application of Hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.

C. Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.

D. Painting: Section 09 91 00, PAINTING.

**1.3 GENERAL**

A. All hardware must comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.

B. Provide rated door hardware assemblies where required by most current version of the International Building Code (IBC).

C. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS. Instead of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.

D. Make hardware for application on metal and wood doors and frames to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.

E. The following items to be of the same manufacturer, if possible, except as otherwise specified:

1. Mortise locksets.
2. Hinges for hollow metal and wood doors.
3. Surface applied overhead door closers.

**1.5 SUBMITTALS**

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation

C. Samples and Manufacturers' Literature:

1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association must be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.
2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates must be accompanied by copies of reports as referenced. The testing must have been conducted in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

**1.6 DELIVERY AND MARKING**

A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to RE/COR for reference purposes. Tag must identify items by Project Specification number and manufacturer's catalog number. These items will remain on file in RE/COR's office until all other similar items have been installed in project, at which time the RE/COR will deliver

items on file to Contractor for installation in predetermined locations on the project.

### 1.7 INSTRUCTIONS

- A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, muted, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters "HW" followed by a number. Each number designates a set of hardware items applicable to a door type.
- B. Keying: Key cylinders into existing Master Key System. Provide removable core cylinders that are removable only with a special key or tool without disassembly of knob or lockset. Provide 6 pin type cylinders. Keying information will be furnished at a later date by the RE/COR.

### 1.8 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
- A156.1-13 Butts and Hinges
  - A156.2-11 Bored and Pre-assembled Locks and Latches
  - A156.4-08 Door Controls (Closers)
  - A156.5-10 Auxiliary Locks and Associated Products
  - A156.6-10 Architectural Door Trim
  - A156.8-10 Door Controls-Overhead Stops and Holders
  - A156.13-12 Mortise Locks and Latches
  - A156.16-02 American National Standard for Auxiliary Hardware
  - A156.18-12 Materials and Finishes
  - A156.31-01 Electric Strikes and Frame Mounted Actuators
- C. American Society for Testing and Materials (ASTM):
- F883-09 Padlocks
- D. Builders Hardware Manufacturers Association (BHMA):
- Certified Products Directory 2014



E. National Fire Protection Association (NFPA):

80-13 Fire Doors and Fire Windows

101-12 Life Safety Code

F. Underwriters Laboratories, Inc. (UL):

Building Materials Directory

## **PART 2 - PRODUCTS**

### **2.1 BUTT HINGES**

A. ANSI A156.1. Provide the following types of butt hinges for the types of doors listed, except where otherwise specified:

1. Exterior Doors: Type A2112 for doors 900 mm (3 feet) wide or less and Type A2111 for doors over 900 mm (3 feet) wide. Provide hinges for exterior doors with non-removable pins.
2. Interior Doors: Type 8112 for doors 900 mm (3 feet) wide or less and Type A8111 for doors over 900 mm (3 feet) wide.

B. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above and continuous hinges specified below.

### **2.3 DOOR CLOSING DEVICES**

A. Provide closing devices of one manufacturer

### **2.4 OVERHEAD CLOSERS**

A. Conform to ANSI A156.4, Grade 1 and the following:

1. 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
2. Hold-open feature, where specified.
3. Size Requirements: Size closers in accordance with manufacturer's recommendations or provide multi-size closers, sizes 1 through 6.
4. Material of closer must be cast aluminum.
5. Steel or malleable iron arm and brackets.
6. Provide with full size cover.
7. Adjustable hydraulic back-check and separate valves for closing and latching speed.

### **2.5 DOOR STOPS**

A. Conform to ANSI A156.16.

- B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For concrete, masonry or quarry tile construction, use lead expansion shields for mounting door stops.

## **2.7 LOCKS AND LATCHES**

- A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over must have beveled fronts. Lock cylinders must have not less than six pins. Cylinders for all locksets to be removable core type. Cylinder to be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Lever or lockset must not require disassembly to remove core from lockset. All locksets or latches on double doors with fire label to have latch bolt with 19 mm (3/4 inch) throw. Provide temporary keying device or construction core of allow opening and closing during construction and prior to the installation of final cores.

- B. In addition, locks and latches must comply with following requirements:

1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13; Series 1000, minimum Grade 2. Locks and latchsets to be furnished with curved lip strike and wrought box. Lock function F02 to be furnished with emergency tools/keys for emergency entrance. Furnish armored fronts for all mortise locks. Where mortise locks are installed in high-humidity locations or where exposed to the exterior on both sides of the opening, provide non-ferrous mortise lock case.
2. Cylindrical Lock and Latch Sets: Levers must meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets to be series 4000 Grade I. Knobs for series 4000 lock and latch sets to have 57 mm (2-1/4 inch) diameters. Where two turn pieces are specified for lock F76, turn piece on inside knob must lock and unlock inside knob, and turn piece on outside knob must unlock outside knob when inside knob is in the locked position. (This function is intended to allow emergency entry into these rooms without an emergency key or any special tool.)

3. Auxiliary locks specified under hardware sets must conform to ANSI A156.5.

## 2.9 ELECTRIC STRIKES

- A. ANSI/ BHMA A156.31 Grade 1.
- B. General: Use fail-secure electric strikes at fire-rated doors.

## 2.10 KEYS

- A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

Locks/Keys	Quantity
Cylinder locks	2 keys each
Cylinder lock change key blanks	10 each different key way
Master-keyed sets	6 keys each
Grand Master sets	6 keys each
Great Grand Master set	5 keys
Control key	1 key

## 2.11 KICK-MOP PLATES

- A. Conform to ANSI Standard A156.6.
- B. Provide protective plates as specified below:
1. Kick-mop plates and armor plates to be metal, Type J100 series, color as required.
  2. Provide kick-mop plates for both sides of each door, except where noted as not required. Kick-mop plates to be 200 mm (8 inches) high. On push side of doors where jamb stop extends to floor, make combination kick-mop plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors to have plates 25 mm (1 inch) less than width of each door. Extend all other combination kick-mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick mop plates to butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.

## 2.17 THRESHOLDS

- A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, install thresholds in

a bed of sealant with machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.

B. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.

## **2.18 WEATHERSTRIPS (For Exterior Doors)**

A. Conform to ANSI A156.22. Air leakage must not to exceed 0.50 CFM per foot of crack length (0.000774m<sup>3</sup>/s/m).

## **2.20 FINISHES**

A. Exposed surfaces of hardware to have ANSI A156.18 finishes as specified below. Provide finishes on all hinges, pivots, closers, thresholds, etc. as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. 626 or 630: Surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges - Exterior Doors: 626 or 630.
2. Hinges - Interior Doors: 652 at rated doors or 626.
3. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color
4. Thresholds: Mill finish aluminum.
5. Other primed steel hardware: 652.

## **2.21 BASE METALS**

A. Apply specified U.S. Standard finishes on different base metals as following:

<b>Finish</b>	<b>Base Metal</b>
652	Steel
626	Brass or bronze
630	Stainless steel

## **PART 3 - EXECUTION**

### **3.1 HARDWARE HEIGHTS**

A. For new buildings locate hardware on doors at heights specified below unless otherwise noted:

**B. Hardware Heights from Finished Floor:**

2. Locksets and latch sets centerline of strike: 1000 mm (40-5/16 inches).
7. Centerline of deadlock strike: 840 mm (33 inches) when used with push-pull latch.
8. Locate other hardware at standard commercial heights.

**3.2 INSTALLATION**

A. Equip and mount closer devices, including those with hold-open features, to provide maximum door opening permitted by building construction or equipment. Closers to be mounted regular arm. Where closers are mounted on doors, mount with sex nuts and bolts; foot fastened to frame with machine screws.

B. Substitute parallel arm or top jamb mounting for regular arm mounting where the following conditions occur:

1. Where door swing, in full open position, would be limited to less than 90 degrees due to partition construction and closer location.
2. Where door to room opens outward into corridor.
3. Where exterior doors open outward.

**C. Hinge Size Requirements:**

Door Thickness	Door Width	Hinge Height
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)
35 mm (1-3/8 inch) (hollow core wood doors)	Not over 1200 mm (4 feet)	113 mm (4-1/2 inches)

D. Provide hinge leaves sufficiently wide to allow doors to swing clear of door frame trim.

E. Where new hinges are specified for new doors in existing frames or existing doors in new frames, provide sizes of new hinges matching sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by RE/COR. Existing hinges cannot be reused on door openings

having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.

F. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Dutch type doors	4 butts
Doors with spring hinges 1370 mm (4 feet 6 inches) high or less	2 butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

G. Fastenings: Suitable size and type to suit with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather must be of nonferrous metal.

H. After locks have been installed; show in presence of RE/COR that keys operate their respective locks in accordance with keying requirements. (Send keys, Master Key level and above by Registered Mail to the Cemetery Director along with the bitting list. Also send a copy of the invoice to the RE/COR for the records.) Installation of locks which do not meet specified keying requirements will be considered sufficient justification for rejection and replacement of all locks installed on project.

### 3.3 FINAL INSPECTION

A. Installer to provide letter to RE/COR that upon completion, installer has visited the Project and has accomplished the following:

1. Re-adjust hardware.
2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
3. Identify items that have deteriorated or failed.
4. Submit written report identifying problems.

### 3.4 HARDWARE SETS

A. Following sets of hardware correspond to hardware symbols shown on drawings. Where hardware set for a single door is specified for a pair

of doors; equip each leaf of such pair of doors with set noted. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.

## HW SET: 01                      DOORS 100 &amp; 101

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
1	EA	ELECTRIC STRIKE	6211 SERIES	626	VON
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	POWER SUPPLY	PS902 X 900-4RL FA		SCE

## CARD READER AND WIRING BY OTHERS

## HW SET: 02                      DOORS 102 &amp; 103

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9070P 06A	626	SCH
1	EA	ELECTRIC STRIKE	6211 SERIES	626	VON
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	POWER SUPPLY	PS902 X 900-4RL FA		SCE

**CARD READER, TIMER AND WIRING BY OTHERS**

- - - E N D - - -

**SECTION 09 06 00**  
**SCHEDULE FOR FINISHES**  
**SECTION 09 06 00-SCHEDULE FOR FINISHES**

NCA Facility: Los Angeles National Cemetery  
Location: Los Angeles  
Project No. and Name: #898CM2023 - Columbarium Expansion  
Submission  
Date:

SCHEDULE FOR FINISHES

09 06 00 - 1



INSTRUCTIONS FOR PREPARATON OF  
SECTION 09 06 00-SCHEDULE FOR FINISHES

GENERAL:

Use SECTION 09 06 00, SCHEDULE FOR FINISHES, as a master format for construction projects, to identify interior and exterior material finishes for type, texture, patterns, color and placement. Fully coordinate with other VA master construction specification sections for information, abbreviations and symbols contained in this Section to be consistent and fully coordinated with those in drawings, finish schedules and material boards.

Provide dimensions in metric followed by English equivalent in parenthesis, when applicable.

Slash symbol (///.. //) Edit information contained between these symbols for project or delete if not applicable. These are not always used.

Delete pages SECTION 09 06 00, SCHEDULE FOR FINISHES-i, ii, iii from final document. Submit complete master document that you received with edit marks during Design Development and Construction Document stage of project. Provide a re-typed version for final document.

Coordinate with VA handbook H-08-14, Room Finishes, Door and Hardware Schedule.

Explanation of Terms:

Material Abbreviations: Use in Room Finish Schedule to identify Finish Materials.

Example: GWB-W is Gypsum Wall Board- Vinyl coated fabric wall covering finish surface.

Paint, Stain, or Coating Code and Finish Code: A number or abbreviation you assign for material color system texture and pattern in conjunction with a manufacturer's identification when applicable.

Instructions for Part I - General

Copy following paragraphs as stated: 1.1 DESCRIPTION, 1.2 MANUFACTURERS, 1.3 SUBMITTALS.

Paragraph 1.5 Color Slides - Interior Views: Include a series of photographic slides, representing a sequential walk-through. Show typical public, patient, staff and all specialized areas. The photography is of architectural quality and is the property of the Department of Veterans Affairs, Office of Facility Management.

Instruction for Part II Products - Interior and Exterior

Edit outline to suit the project. The outline is divided by technical specification section and list items requiring finish selections. Locations are designated either in Room Finish Schedule in this section or shown on drawings.

Some products are listed for which a VA guide specifications is not available; no technical Section number shown, Section will have to be written.

Identify locations for products not shown in Room Finish Schedule. Some items require identification of room number and name to establish location.

Identify color, texture, patterns as applicable with manufacturer's identification label with a product or abbreviations are identified throughout drawings and specification sections. Coordinate for uniformity and consistency. Do not duplicate abbreviations for different materials. Avoid conflicts with technical specification sections. Example; Vinyl Composition Tile (VCT).

SCHEDULE FOR FINISHES

Some Sections specify finish on product and are not included in Part II, i.e. 10 75 00, FLAGPOLES. Whenever possible minimize use of multiple manufacturer's for colors and ones which constitute large quantities such as paint, plastic, laminate and carpet.

Loose items are not permitted in construction contracts unless an integral component of a fixed item i.e. keys for locks, adjustable shelves in cabinets.

Give preference to products containing recovered materials when price performance and availability meets project requirements.

Give sizes in metric followed by English in parenthesis, i.e. 100 mm (4 inches).

Instructions for Part III - Execution

Paragraph 3.1 a: Finish Schedules and Miscellaneous Abbreviations-provide a complete list of product abbreviations used on project. Edit list to suit project.

Paragraph 3.1 b: Finish Schedule Symbols: Edit symbol list to suit project.

Paragraph 3.2: Room Finish Schedule- Finish schedule format is contained in architectural package or at end of this Section. Surface for walls "C" is for free standing columns.

Finish Plans: these plans are a part of architectural drawing set as an adjunct to the finish schedule.

Use for showing wall, ceiling and floor patterns and identifying stopping and starting points for finishes exterior elevations may be used to show locations of various finishes identified by finish code and materials.

**SECTION 09 06 00  
SCHEDULE FOR FINISHES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the Room Finish Schedule or shown for other locations.

**1.2 MANUFACTURERS**

- A. Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

**1.3 SUBMITALS**

- A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, provide quadruplicate samples for color approval of materials and finishes specified in this section.
- B. Color Schedule: Submit full color schedule including manufacturers intending to be provided for project, with equivalent colors to selections provided by this section; format to match this section.

**1.4 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. MASTER PAINTING INSTITUTE: (MPI)

## 1. Architectural Painting Specification Manual

**1.5 PRODUCTS**

## A. color BOARD

1. Size: As required to display building finishes.
2. Labeled for:
  - a. Building name and number.
  - b. All finishes used.

## B. Division 03 - CONCRETE

1. SECTION 03 30 53, CAST IN PLACE CONCRETE (SHORT FORM)

Surface	Finish Description
EC-1: Floors/Exposed Slabs	Exposed concrete, broom finished

## C. DIVISION 04 - MASONRY

1. SECTION 04 43 00, NATURAL STONE VENEER

Name of Stone	Color, Texture, Finish	Stone Source
ST-1: Granite Cladding	Thermal finish; Sierra White	Cold Spring Granite or equal
ST-2: Marble Cladding	Polished finish; Cherokee Marble	White Marble

2. SECTION 06 20 00, FINISH CARPENTRY

Room No. and Name	Component	Material	Species	Finish	Color
	Countertop	Solid surface		Smooth	Dove
	Vertical Surface(s)				
	Trim				
	Reveal				
	Base				

Room No. and Name	Component	Material	Species	Finish	Color
Ceiling at Shelter and Kiosk	Tongue and Groove Ceiling	Wood	Western Red Cedar	1 coat Sikkens Cetol 1 #078 Natural, 2 coats Sikkens Cetol 23 #078 Natural or equal	Natural

## D. Division 07 - THERMAL AND MOISTURE PROTECTION

## 1. SECTION 07 41 13, STANDING SEAM METAL ROOFING

Finish Code	Manufacturer	Mfg. Color Name/No.
MTL-1	Imetco or Equal	Glacier Grey Texturematte
MTL-2	Imetco or Equal	Glacier Grey Texturematte
MTL-3	Imetco or Equal	Glacier Grey Texturematte

## E. Division 08 - OPENINGS

## 1. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

Paint both sides of door and frames same color including ferrous metal louvers, and hardware attached to door	
Component	Color of Paint Type and Gloss
Door	P4
Frame	P4
Window Frame	

## F. Division 09 - FINISHES

## 1. SECTION 09 30 13, TILING

CERAMIC TILE (FT)					
Color	Size	Shape	Pattern	Manufacturer	Mfg. Color Name/No.
#540 Truffle	6 inch by 6 inch mosaic				
Accent Brown VL78	6 inch by 12 inch				

CERAMIC TILE (FT)					
Color	Size	Shape	Pattern	Manufacturer	Mfg. Color Name/No.
	cove base				
CERAMIC WALL TILE (CWT)					
Color	Size	Shape	Pattern	Manufacturer	Mfg. Color Name/No.
Artic White 0790	3 inch by 6 inch			Daltile	Matte finish
MARBLE THRESHOLDS (MT)					
Marble Type		Manufacturer		Mfg. Color Name/No.	
ST-1					

2. SECTION 09 65 13, RESILIENT BASE AND ACCESSORIES

Finish Code	Item	Height	Manufacturer	Mfg Name/No.
B-1	Rubber Base (RB)	4 inches	VPI or equal	94 Black-Brown

3. SECTION 09 91 00, PAINT AND COATINGS

a. MPI Gloss and Sheen Standards:

- |                  |  |                                   |
|------------------|--|-----------------------------------|
| 1) Gloss @60     | Sheen @85                              |                                   |
| 2) Gloss Level 1 | a traditional matte finish-flat        | max 5 units, and<br>max 10 units  |
| 3) Gloss Level 2 | a high side sheen flat-"a velvet-like" | max 10 units, and                 |
| 4) finish        |  | 10-35 units                       |
| 5) Gloss Level 3 | a traditional "egg-shell like" finish  | 10-25 units, and<br>10-35 units   |
| 6) Gloss Level 4 | a "satin-like" finish                  | 20-35 units, and<br>min. 35 units |

## SCHEDULE FOR FINISHES

- 7) Gloss Level 5      a traditional semi-gloss                      35-70 units  
 8) Gloss Level 6      a traditional gloss    70-85 units  
 9) Gloss level 7      a high gloss    more than 85 units

2. Paint Code	Gloss	Manufacturer	Mfg. Color Name/No.
P-1	Eggshell	Dunn Edwards (Or equal)	Dew 340 Whisper
P-2	Matte	Dunn Edwards (Or equal)	LRV 80 Cottage White
P-3	Matte	Dunn Edwards (Or equal)	Dew 340 Whisper
P-4	Eggshell	Dunn Edwards (Or equal)	Dew LRV 18 Legendary Gray
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
3. Stain Code (S)	Gloss and Transparency	Manufacturer	Mfg. Color Name/No.

	Semi		
S			
S			
S			
S			
S	Opaque		
S			
S			
S			
S			
4. Clear Coatings Code(CC)	Gloss	Manufacturer	Mfg. Color Name/No.
CC			
CC			

## G. Division 10 - SPECIALTIES

## 1. SECTION 10 14 00, EXTERIOR SIGNS

Component	Background Finish	Type Color	Manufacturer	Mfg. Color Name/No.
	Cast Bronze	White	Matthews	MP7458
	Wells Fargo Black	White	Matthews	MP26309
	Gaeta Olive	White	Matthews	MP15178
	Ship Yard Grey	White	Matthews	MP12416
	Trendy Grey Metallic	White	Matthews	MP30896
	B1, Dark Brown Anodized	White	Matthews	MP20190
	B2, Handicapped Blue	White	Matthews	MP15085

## SCHEDULE FOR FINISHES



Component	Background Finish	Type Color	Manufacturer	Mfg. Color Name/No.
	B3, Red (OSHA)	White	Matthews	MP55153
	B4, VA Blue	White	Matthews	MP09144
	B7, White	Black	Matthews	MP32071
	B8, Yellow (OSHA)	Black	Matthews	MP55391

## 2. SECTION 10 14 05, INTERIOR SIGNS

## 3. SECTION 10 21 13, TOILET COMPARTMENTS

Room No. and Name	Component	Material	Manufacturer	Mfg. Color Name/No.
TP-1 Restrooms	Ceiling Hung	Solid Phenolic	Bobrick or equal	S-431 Willow Grey

## a. PART III - EXECUTION

## H. FINISH SCHEDULES &amp; MISCELLANEOUS ABBREVIATIONS

FINISH SCHEDULE & MISCELLANEOUS ABBREVIATIONS	
Term	Abbreviation
Acoustical Ceiling	AT
Anodized Aluminum Colored	AAC
Anodized Aluminum Natural Finish	AA
Baked On Enamel	BE

## SCHEDULE FOR FINISHES

Brick Face	BR
Carpet	CP
Carpet Module Tile	CPT
Concrete	C
Concrete Masonry Unit	CMU
Existing	E
Exposed Divider Strips	EXP
Exterior	EXT
Exterior Finish System	EFS
Exterior Paint	EXT-P
Exterior Stain	EXT-ST
Fabric Wallcovering	WF
Facing Tile	SCT
Floor Mats & Frames	FM
Floor Tile, Mosaic	FT
Fluorocarbon	FC
Granite	GT
Gypsum Wallboard	GWB
High Glazed Coating	SC
Latex Mastic Flooring	LM
Marble	MB
Material	MAT
Mortar	M
Multi-Color Coating	MC
Natural Finish	NF

Paint	P
Paver Tile	PVT
Plaster	PL
Plaster High Strength	HSPL
Plaster Keene Cement	KC
Plastic Laminate	HPDL
Polypropylene Fabric Wallcovering	PFW
Porcelain Paver Tile	PPT
Rubber Base	RB
Rubber Tile Flooring	RT
Stain	ST
Stone Flooring	SF
Suspension Decorative Grids Grids	SDG
Veneer Plaster	VP
Vinyl Base	VB
Vinyl Coated Fabric Wallcovering	W
Vinyl Composition Tile	VCT
Vinyl Sheet Flooring	VSF
Vinyl Sheet Flooring (Welded Seams)	WSF
Wall Border	WB
Wood	WD

## I. FINISH SCHEDULE SYMBOLS

## SCHEDULE FOR FINISHES

09 06 00 - 12

## 1. Symbol Definition

- a. \*\* Same finish as adjoining walls
- b. - No color required
- c. E Existing
- d. XX To match existing
- e. EFTR Existing finish to remain
- f. RM Remove

## J. ROOM FINISH SCHEDULE

- 1. Match adjoining or existing similar surfaces colors, textures or patterns where disturbed or damaged by alterations or new work when not scheduled.

## 2. ROOM FINISH SCHEDULE

Room No. and Name		FLOOR			BASE		WALL		WAINSCOT		CEILING		REMARKS
		MAT	FC		MAT	FCC	MAT	FCC	MAT	FC	MAT	FCC	
	E X I S T			N									
				E									
				S									
				W									
				C									
	N E W			N									
				E									
				S									
				W									

SCHEDULE FOR FINISHES

09 06 00 - 13

Room No. and Name		FLOOR			BASE		WALL		WAINSCOT		CEILING	REMARKS
				C								
	E X I S T			N								
				E								
				S								
				W								
				C								
	N E W			N								
				E								
				S								
				W								
				C								
	E X I S T			N								
				E								
				S								
				W								
				C								
	N E W			N								
				E								
				S								
				W								
				C								

- - - END - - -

SCHEDULE FOR FINISHES

09 06 00 - 15

**SECTION 09 22 16**  
**NON-STRUCTURAL METAL FRAMING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section specifies steel studs wall systems, curved ceiling framing, furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, or other building boards.

**1.2 RELATED WORK**

A. Load bearing framing: Section 05 40 00, COLD-FORMED METAL FRAMING.

B. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.

C. Ceiling suspension systems for lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS, Section 09 29 00, GYPSUM BOARD.

**1.3 TERMINOLOGY**

A. Description of terms to be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead is defined as the underside of the floor or roof construction supported by beams, trusses, or bar joists.

C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

**1.4 SUBMITTALS**

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Studs, runners and accessories.
2. Hanger inserts.
3. Channels (Rolled steel).
4. Furring channels.
5. Screws, clips and other fasteners.

C. Shop Drawings:

1. Typical ceiling suspension system.
2. Typical metal stud and furring construction system including details around openings and corner details.

**1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE**

A. In accordance with the requirements of ASTM C754.

**1.6 APPLICABLE PUBLICATIONS**

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

B. American Society For Testing And Materials (ASTM):

1. A123/A123M-12 - Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products
2. A641/A641M-09a - Zinc-Coated (Galvanized) Carbon Steel Wire
3. A653/A653M-11 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process
4. C11-13 - Terminology Relating to Gypsum and Related Building Materials and Systems
5. C635/C635M-13 - Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings
6. C645-11a - Non-Structural Steel Framing Members
7. C754-11 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
8. C841-03(2008)c1 - Installation of Interior Lathing and Furring
9. C954-11 - Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

**PART 2 - PRODUCTS****2.1 STEEL STUDS AND RUNNERS (TRACK)**

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.

1. Deflection Limit:
  - a. L/240 unless otherwise noted.
  - b. L/360 where Level 5 gypsum board finish is indicated, at tile backing panels, where plaster veneer is indicated, and elsewhere as indicated.
2. Lateral Pressure: 5.0 psf (240 Pa) unless otherwise noted.



3. Curved Framing Members: Provided curved members as indicated on Drawings.

- B. Steel Sheet Components: Comply with ASTM C645 requirements for metal, unless otherwise indicated.
- C. Protective Coating: ASTM A653, Z120 (G40), hot-dip galvanized, unless otherwise indicated.
- D. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24 inch) centers.
- E. Doubled studs for openings and studs for supporting concrete backer-board.
- F. Provide studs 3600 mm (12 feet) or less in length in one piece.

## **2.2 FURRING CHANNELS**

- A. Rigid furring channels (hat shape): ASTM C645.
- B. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.
  - 1. Configuration: hat shaped.
- C. "Z" Furring Channels:
  - 1. Not less than 0.45 mm (0.0179-inch)-thick bare metal, with 32 mm (1-1/4 inch) and 19 mm (3/4-inch) flanges.
  - 2. Web furring depth to suit thickness of insulation with slotted perforations.
- D. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

## **2.3 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES**

- A. Conform to ASTM C754, except as otherwise specified.
- B. For fire rated construction: Type and size same as used in fire rating test.
- C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick.  
Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.
- D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items.  
Clips used instead of tie wire must have holding power equivalent to that provided by the tie wire for the specific application.

E. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.

F. Tie Wire and Hanger Wire:

1. ASTM A641, soft temper, Class 1 coating.
2. Gage (diameter) as specified in ASTM C754 or ASTM C841.

G. Attachments for Wall Furring:

1. Manufacturer's standard items fabricated from zinc-coated (galvanized) steel sheet.
2. For concrete or masonry walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.

H. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

## **2.4 COMPONENT FINISH**

A. Provide framing components with Z180 (G60) minimum per ASTM A123.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION CRITERIA**

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this section.

### **3.2 INSTALLING STUDS**

A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.

B. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.

1. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where otherwise indicated. Continue framing over frames of doors and openings

and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

- C. Install steel studs and furring in sizes and at spacing indicated.
- D. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.
- E. Frame door openings to comply with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
  - 1. Install two (2) studs at each jamb, unless otherwise indicated.
- F. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

### **3.3 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS**

- A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for plaster ceilings or soffits.
- B. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
- C. Where width of ducts and other construction within ceiling plenum produces hanger spacing that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads, within performance limits established by referenced standards.
- D. Secure wire hangers by looping and wire-tying, directly to structures or to inserts, eyescrews, or other devices and fasteners that are

secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.

E. Install suspended steel framing components in sizes and at spacing indicated, but not less than that required by the referenced steel framing installation standard.

1. Wire Hangers: 1219 mm (48 inches) o.c.

2. Carrying Channels (Main Runners): 1219 mm (48 inches) o.c.

3. Furring Channels (Furring Members): 406 mm (16 inches) o.c.

F. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 3 mm (1/8 inch) in 3.66 meters (12 feet) as measured both lengthwise on each member and transversely between parallel members.

G. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

H. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track

### **3.4 TOLERANCES**

A. Fastening surface for application of subsequent materials: Not varying more than 3 mm (1/8-inch) from the layout line.

B. Plumb and align vertical members within 3 mm (1/8-inch).

C. Level or align ceilings within 3 mm (1/8-inch).

- - - END - - -

**SECTION 09 29 00  
GYPSUM BOARD**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section specifies installation and finishing of gypsum board.

**1.2 RELATED WORK**

A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

B. Sealants: Section 07 92 00, JOINT SEALANTS.

**1.3 TERMINOLOGY**

A. Definitions and description of terms to be in accordance with ASTM C11, C840, and as specified.

**1.4 SUBMITTALS**

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Cornerbead and edge trim.
2. Finishing materials.
3. Gypsum board, each type.

C. Shop Drawings:

1. Typical gypsum board installation of all assemblies, showing corner details, edge trim details and the like.

D. Samples:

1. Cornerbead.
2. Edge trim.
3. Control joints.

**1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE**

A. In accordance with the requirements of ASTM C840.

**1.6 ENVIRONMENTAL CONDITIONS**

A. In accordance with the requirements of ASTM C840.

**1.7 APPLICABLE PUBLICATIONS**

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic

designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

B. American Society for Testing and Materials (ASTM):

1. C11-13 - Terminology Relating to Gypsum and Related Building Materials and Systems
2. C475/C475M-12 - Joint Compound and Joint Tape for Finishing Gypsum Board
3. C840-11 - Application and Finishing of Gypsum Board
4. C954-11 - Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
5. C1002-07 - Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
6. C1047-10a - Accessories for Gypsum Wallboard and Gypsum Veneer Base
7. C1177/C1177M-08 - Glass Mat Gypsum Substrate for Use as Sheathing
8. C1280-11 - Application of Exterior Gypsum Panel Products for Use as Sheathing
9. C1325-08b - Fiber Mat Reinforced Cementitious Backer Unit
10. C1396/C1396M-13 - Gypsum Board
11. C1658/C1658M - Glass Mat Gypsum Panels
12. D3273-12 - Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

## **PART 2 - PRODUCTS**

### **2.1 GYPSUM BOARD**

- A. Gypsum Backing Board - Mold and Moisture-Resistant: ASTM C1396, 16 mm (5/8 inch) thick.
- B. Cementitious Backing Board: ASTM C1325, use in showers.
- C. Provide gypsum cores with a minimum of 95 percent post industrial recycled gypsum content. Provide paper facings with 100 percent post-consumer recycled paper content.

**2.2 GYPSUM SHEATHING BOARD**

- A. Provide panels complying with ASTM C1177 and ASTM C1396, Type X, water-resistant core, 16 mm (5/8 inch) thick.

**2.3 ACCESSORIES**

- A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet or rigid PVC plastic.

**2.4 FASTENERS**

- A. ASTM C1002 and ASTM C840, except as otherwise specified.
- B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).
- C. For fire rated construction, type and size same as used in fire rating test.

**2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE**

- A. ASTM C475 and ASTM C840.
- B. Provide material free of antifreeze, vinyl adhesives, preservatives and biocides; VOC content within limits of stated performance requirements.
- C. Joint Tape: Use cross-laminated, tapered edge, reinforced paper, or fiber glass mesh tape recommended by the manufacturer.

**PART 3 - EXECUTION****3.1 GYPSUM BOARD HEIGHTS**

- A. Extend gypsum board from floor to heights as follows, unless shown otherwise:
  - 1. Not less than 150 mm (6 inches) above suspended acoustical ceilings.
  - 2. At ceiling of suspended gypsum board ceilings.
  - 3. At existing ceilings.

**3.2 INSTALLING GYPSUM BOARD**

- A. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
- B. Provide and install moisture and mold-resistant glass-mat-faced interior gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in high humidity and wet areas or locations which might be subject to moisture exposure during construction.

## C. Ceilings:

1. For single-ply construction, use perpendicular application.
2. For two-ply assemblies:
  - a. Use perpendicular application.
  - b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.

## D. Install control joints in accordance with ASTM C840.

## E. Accessories:

1. Install the following accessories in accordance with ASTM C1047.
  - a. Corner Beads.
  - b. Edge Trim (casing beads).

**3.3 INSTALLING GYPSUM SHEATHING**

- A. Comply with ASTM C1280; install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
- B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.
- C. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.
- D. Seal sheathing joints according to sheathing manufacturer's written recommendations.
  1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed sealant in entire face of tape.
  2. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered.
  3. Seal other penetrations and openings.

**3.4 FINISHING OF GYPSUM BOARD**

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840.
- B. Use Level 5 finish for all finished areas open to public view; level 2 finish in utility, maintenance and service areas and level 1 in plenums, attics and other concealed areas.



- C. Follow manufacturer's fire testing reports where fire resistant construction is shown on drawings.

### 3.5 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non-decorated surface to provide fire protection equivalent to the fire rated construction.

- - - END - - -

**SECTION 09 30 13  
TILING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies ceramic tile, marble thresholds tile backer board.

**1.2 RELATED WORK**

- A. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.
- B. Color, texture and pattern of field tile and trim shapes, size of field tile, trim shapes, and color of grout specified: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Grout: Provide materials complying with SCAQMD Rule 1168; petroleum- and plastic-free grout.
- B. Finish Flooring: Provide Floor Score certification.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Base tile, each type, each color, each size.
  - 2. Ceramic tile, each type, color, patterns and size.
  - 3. Wall (or wainscot) tile, each color, size and pattern.
  - 4. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.
- C. Product Data:
  - 1. Ceramic tile, marked to show each type, size, and shape required.
  - 2. Cementitious backer unit.
  - 3. Divider strip.
  - 4. Reinforcing tape.
  - 5. Leveling compound.
  - 6. Latex-Portland cement mortar and grout.
  - 7. Slip resistant tile.
  - 8. Fasteners.
- D. Certification:

1. Master grade, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
  - a. Cementitious backer unit.
  - b. Reinforcing tape.
  - c. Latex-Portland cement mortar and grout.
  - d. Leveling compound.

#### **1.5 DELIVERY AND STORAGE**

- A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.
- B. Store material to prevent damage or contamination.

#### **1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American National Standards Institute (ANSI):
  1. A108.1B-13 - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with dry-Set or latex-Portland Cement Mortar
  2. A108.11-10 - Interior Installation of Cementitious Backer Units
  3. A108.5-10 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
  4. A118.4-12 - Latex-Portland Cement Mortar
  5. A118.6-10 - Standard Cement Grouts for Tile Installation
  6. A137.1-12 - Ceramic Tile
- C. American Society for Testing and Materials (ASTM):
  1. C241/C241M-13 - Abrasion Resistance of Stone Subjected to Foot Traffic
  2. C627-10 - Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
  3. C954-11 - Steel Drill Screws for the Application of Gypsum Board on Metal Plaster Base to Steel Studs from 0.033 in (0.84 mm) to 0.112 in (2.84 mm) in thickness

4. C979/C979M-10 - Pigments for Integrally Colored Concrete
5. C1002-07 - Steel Self-Piercing Tapping Screws for the Application of Panel Products
6. C1027-09 - Determining "Visible Abrasion Resistance on Glazed Ceramic Tile"
7. C1028-07e1 - Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method
8. C1325-08b - Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units
- D. Marble Institute of America (MIA): Design Manual 7.2-2011
- E. South Coast Air Quality Management District (SCAQMD):
  1. SCAQMD Rule 1168 (1989/R2005) Adhesive and Sealant Applications
- F. Tile Council of North America, Inc. (TCNA):
  1. Handbook for Ceramic, Glass, and Stone Tile Installation

## **PART 2 - PRODUCTS**

### **2.1 TILE**

- A. Comply with ANSI A137.1, Standard Grade, except as modified:
  1. Inspection procedures listed under the Appendix of ANSI A137.1.
  2. Abrasion Resistance Classification: Tested in accordance with values listed in Table 1, ASTM C1027.
  3. Slip Resistant Tile for Floors - Coefficient of friction, when tested in accordance with ASTM C1028, required for level of performance: Not less than 0.7 (wet condition) for bathing areas.
  4. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
  5. Factory-Applied Temporary Protective Coating:
    - a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of petroleum paraffin wax, applied hot.
    - b. Do not coat unexposed tile surfaces.

B. Glazed Wall Tile: Cushion edges, glazing, as specified in Section 09 06 00, SCHEDULE FOR FINISHES.

C. Trim Shapes:

1. Conform to applicable requirements of adjoining floor and wall tile.
2. Use trim shapes sizes specified in Section 09 06 00, SCHEDULE FOR FINISHES.

## **2.2 CEMENTITIOUS BACKER UNITS**

A. Use behind all wall and ceiling tile.

B. Comply to ASTM C1325.

C. Joint materials for Cementitious Backer Units:

1. Reinforcing Tape: Vinyl coated woven glass fiber mesh tape, open weave, 50 mm (2 inches) wide. Tape with pressure sensitive adhesive backing will not be permitted.
2. Tape Embedding Material: Latex-Portland cement mortar complying with ANSI A108.1.
3. Joint material, including reinforcing tape, and tape embedding material, must be as specifically recommended by the backer unit manufacturer.

## **2.3 FASTENERS**

A. Screws for Cementitious Backer Units:

1. Standard screws for gypsum board are not acceptable.
2. Minimum 11 mm (7/16 inch) diameter head, corrosion resistant coated, with washers.
3. ASTM C954 for steel 1 mm (0.033 inch) thick.
4. ASTM C1002 for steel framing less than 0.0329 inch thick.

B. Washers: Galvanized steel, 13 mm (1/2 inch) minimum diameter.

## **2.4 SETTING MATERIALS OR BOND COATS**

A. Conform to TCA Handbook for Ceramic Tile Installation.

B. Latex-Portland Cement Mortar: ANSI A118.4.

1. For wall applications, provide non-sagging, latex-Portland cement mortar complying with ANSI A118.4.

## **2.5 GROUTING MATERIALS**

A. Coloring Pigments:

1. Pure mineral pigments, lime-proof and nonfading, complying with ASTM C979.
2. Addition of coloring pigments to grout must be by the manufacturer; job colored grout is not acceptable.
3. Use is required in Latex-Portland Cement Grout.
- B. Latex-Portland Cement Grout: ANSI A118.7 color as specified.
  1. Unsanded grout mixture for joints 3.2 mm (1/8 inch) and narrower.
  2. Sanded grout mixture for joints 3.2 mm (1/8 inch) and wider.
- C. Grout Sealer: Grout manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

## **2.6 PATCHING AND LEVELING COMPOUND**

- A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

## **2.7 MARBLE**

- A. Soundness Classification in accordance with MIA Design Manual.
- B. Thresholds:
  1. Group A, Minimum abrasive hardness (Ha) of 10.0 per ASTM C241.
  2. Honed finish on exposed faces.
  3. Thickness and contour as shown.
  4. Fabricate from one piece without holes, cracks, or open seams; full depth of wall or frame opening by full width of wall or frame opening; 19 mm (3/4-inch) minimum thickness and 6 mm (1/4-inch) minimum thickness at beveled edge.
  5. Set not more than 13 mm (1/2-inch) above adjoining finished floor surfaces, with transition edges beveled on a slope of no greater than 1:2. On existing floor slabs provide 13 mm (1/2-inch) above ceramic tile surface with bevel edge joint top flush with adjacent floor.
  6. Provide one piece full width of door opening; notch thresholds to match profile of door jambs.

## **2.8 WATER**

- A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

**2.9 CLEANING COMPOUNDS**

- A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
- B. Materials containing acid or caustic material not acceptable.

**PART 3 - EXECUTION****3.1 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain environmental temperature and humidity within all manufacturers' recommendations.

**3.2 ALLOWABLE TOLERANCE**

- A. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:
  - 1. Not more than 1 in 500 (1/4 inch in 10 feet) from required elevation where Portland cement mortar setting bed is used.
  - 2. Not more than 1 in 1000 (1/8 inch in 10 feet) where dry-set Portland cement, and latex-Portland cement mortar setting beds and chemical-resistant bond coats are used.
- B. Variation in Plane of Wall Surfaces:
  - 1. Not more than 1 in 400 (1/4 inch in eight feet) from required plane where Portland cement mortar setting bed is used.
  - 2. Not more than 1 in 800 (1/8 inch in eight feet) where dry-set or latex-Portland cement mortar or organic adhesive setting materials is used.

**3.3 SURFACE PREPARATION**

- A. Cleaning New Concrete or Masonry:
  - 1. Chip out loose material, clean off all oil, grease dirt, adhesives, curing compounds, and other deterrents to bonding by mechanical method, or by using products specifically designed for cleaning concrete and masonry.
  - 2. Use self-contained power blast cleaning systems to remove curing compounds and steel trowel finish from concrete slabs where ceramic tile will be installed directly on concrete surface with thin-set materials.

3. Steam cleaning or the use of acids and solvents for cleaning will not be permitted.

B. Patching and Leveling:

1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.
  - a. Thickness of compound as required to bring finish tile system to elevation shown.
  - b. Float finish
  - c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
3. Apply patching and leveling compound to concrete and masonry wall surfaces that are out of required plane.
4. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.

C. Walls:

1. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
2. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.

### **3.4 CEMENTITIOUS BACKER UNITS**

- A. Remove polyethylene wrapping from cementitious backer units and separate to allow for air circulation. Allow moisture content of backer units to dry down to a maximum of 35 percent before applying joint treatment and tile.
- B. Install in accordance with ANSI A108.11 except as specified otherwise.

### **3.5 MARBLE**

- A. Secure thresholds and stools in position with minimum of two stainless steel dowels.
- B. Set in dry-set Portland cement mortar or latex-Portland cement mortar bond coat.



### 3.6 CERAMIC TILE - GENERAL

- A. Comply with ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" applicable to methods of installation.
- B. Comply with TCNA Installation Guidelines:
- C. Installing Mortar Beds for Floors:
  - 1. Install mortar bed to not damage waterproof or crack isolation membrane; 32 mm (1-1/2 inch) minimum thickness.
  - 2. Install floor mortar bed reinforcing centered in mortar fill.
  - 3. For thin set systems cure mortar bed not less than seven days; do not use curing compounds or coatings.
  - 4. For tile set with Portland cement, paste over plastic mortar bed coordinate to set tile before mortar bed sets.
- D. Setting Beds or Bond Coats:
  - 1. Where recessed or depressed floor slabs are filled with Portland cement mortar bed, set ceramic mosaic floor tile with latex-Portland cement mortar over cured mortar bed except as specified otherwise, ANSI A108-1B, TCNA System F111 or F112.
  - 2. Set trim shapes in same material specified for setting adjoining tile.
- E. Workmanship:
  - 1. Comply with all ANSI 108, 118, 136, and 137 requirements.
  - 2. Joints:
    - a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.
    - b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.
  - 3. Back Buttering: For installations indicated below, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
    - a. Tile wall installations in wet areas.
    - b. Tile wall installations composed of tiles 200 by 200 mm (8 by 8 inches or larger).

### 3.7 GROUTING

- A. Grout Type and Location: Refer 09 06 00, SCHEDULE OF FINISHES.

B. Workmanship:

1. Install and cure grout in accordance with the applicable standard.
2. Portland Cement grout: ANSI A108.1.

**3.8 MOVEMENT JOINTS**

- A. Prepare tile expansion, isolation, construction and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.
- B. TCA details EJ 171.

**3.9 CLEANING**

- A. Thoroughly sponge and wash tile.
- B. Polish glazed surfaces with clean dry cloths.
- C. Methods and materials used must not damage or impair appearance of tile surfaces.
- D. The use of acid or acid cleaners on glazed tile surfaces is prohibited.
- E. Clean tile as recommended by the manufacturer of the grout and bond coat.
- F. Apply grout sealer.

**3.10 PROTECTION**

- A. Keep traffic off tile floor, until grout and setting material is firmly set and cured.
- B. Where traffic occurs over tile floor, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

**3.11 TESTING FINISH FLOOR**

- A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.

**3.12 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE**

- A. Interior Floor Installations, Concrete Subfloor:
  1. Ceramic Tile Installation: TCNA F112 and ANSI A108.1B; cement mortar bed (thickset) bonded to concrete.

- a. Bond Coat for Cured-Bed Method:// Dry-set // Latex- // Medium-bed, latex- //Portland cement mortar.
- b. Grout: Sand-Portland cement grout.
- 2. Ceramic Tile Installation: TCNA F113; thin-set mortar.
  - a. Bond Coat for Cured-Bed Method: Latex- Portland cement mortar.
- B. Grout: Sand-Portland cementInterior Wall Installations, Masonry or Concrete:
  - 1. Ceramic Tile Installation: TCNA W202; thin-set mortar.
    - a. Bond Coat for Cured-Bed Method: Latex- Portland cement mortar.
    - b. Grout: Standard unsanded cement grout.
- C. Interior Wall Installations, Wood or Metal Studs or Furring:
  - 1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thin-set mortar on cementitious backer units .
    - a. Thin-set Mortar: Latex- Portland cement mortar.
    - b. Grout: Standard unsanded cement grout.

- - - END - - -

**SECTION 09 54 26**  
**WOOD PLANK CEILINGS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Section Includes:
  - 1. Wood plank ceilings.

**1.2 SUBMITTALS**

- A. Shop Drawings: Indicate wood ceiling reflected plan, location of mechanical and electrical components, details of junction with dissimilar materials, and points of suspension.
- B. Product Data: Submit data for component profiles, materials, trim and wood finishes.
- C. Samples: Submit two samples wood panels illustrating color and finish of exposed to view components.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

**1.3 QUALITY ASSURANCE**

- A. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

**1.4 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Accept factory-finished products on site in manufacturer's unopened factory packaging only; reject opened packages.
- B. Protect factory-finished products from damage to appearance by storing products in manufacturer's unopened factory packaging in dry storage area.

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.

**1.7 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**PART 2 - PRODUCTS****2.1 PERFORMANCE REQUIREMENTS**

- A. Wood Ceilings and Suspension System:
  - 1. Support dead loads, including light fixtures, accessories, and other indicated components, without eccentric loading of supports.
  - 2. Resist dead loads with maximum deflection of 1/360 of span.
  - 3. Resist seismic loads required by applicable code. by using practices specified in ASTM E580.

**2.2 WOOD CEILING**

- A. Ceiling Strip:
  - 1. Plank edge.
  - 2. Beveled tongue and groove.
  - 3. Plank Dimensions: As indicated on drawings.
  - 4. Plank Thickness: Manufacturer's standard thickness.
  - 5. Species and Finish: As specified: Section 09 06 00, SCHEDULE FOR FINISHES.
  - 6. Solid plank, no perforation.
- B. Suspension System: As specified in Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- C. Accessories: Provide hangers and fasteners to install suspension system.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verify layout of hangers do not interfere with other work.
- B. Verify required utilities are available, in proper location, and ready for use.

**3.2 INSTALLATION**

- A. Suspension Components: Install in accordance with manufacturer's instructions, after overhead work is complete.
- B. Suspension System:

1. Hang carrying members independent of columns, light fixtures, pipe, and conduit; where carrying members are spliced, avoid visible displacement of ceiling strips.
  2. Where building services or other equipment prevent regular spacing of hangers, reinforce nearest adjacent hangers to span required distance.
- C. Ceiling Strips: Stagger end joint splices minimum 12 inches.
1. Set exterior end joints with 1/16 inch gap for expansion and contraction.
  2. Install edge moldings and trim as indicated on Drawings.
  3. Exercise care when site cutting sight-exposed finished components to ensure surface finish is not defaced.

### **3.3 ERECTION TOLERANCES**

- A. Maximum Variation from Plane: 1/8 inch in 10 feet.
- B. Maximum Variation from Level: 1/8 inch in 10 feet.

- - -END OF SECTION - - -

**SECTION 09 65 13  
RESILIENT BASE AND ACCESSORIES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section specifies the installation of resilient base.

**1.2 RELATED WORK**

A. Color and texture: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Base material manufacturer's recommendations for adhesives.
2. Application and installation instructions.

C. Samples:

1. Base: 150 mm (6 inches) long, each type and color.
2. Adhesive: Each type.

**1.4 DELIVERY**

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Materials from containers which have been distorted, damaged or opened prior to installation will be rejected.

**1.5 STORAGE**

A. Follow manufacturer's instruction for storage and protection from damage by handling and construction operations before, during, and after installation.

**1.6 APPLICABLE PUBLICATIONS**

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

B. American Society for Testing and Materials (ASTM):

1. F1861-08(2012)e1 - Resilient Wall Base

**PART 2 - PRODUCTS****2.1 GENERAL**

- A. Use only products by the same manufacturer and from the same production run.

**2.2 RESILIENT BASE**

- A. ASTM F1861, 3 mm (1/8 inch) thick, 100 mm (4 inches) high, Type TP (Thermoplastic Rubber).
- B. Where carpet occurs, use Style A-straight at carpet locations; Style B-cove other locations.

**2.3 PRIMER (FOR CONCRETE FLOORS)**

- A. As recommended by the adhesive and tile manufacturer.

**2.4 LEVELING COMPOUND (FOR CONCRETE FLOORS)**

- A. Provide products with latex or polyvinyl acetate resins in the mix.

**2.5 ADHESIVES**

- A. Use products recommended by the material manufacturer for the conditions of use.
- B. Provide low VOC products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

**PART 3 - EXECUTION****3.1 PROJECT CONDITIONS**

- A. Maintain temperature of materials above 21o C (70 degrees F), for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs, between 21o C and 27o C (70oF and 80oF) for at least 48 hours, before, during, and after installation.
- C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

**3.2 INSTALLATION REQUIREMENTS**

- A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the RE/COR.



- B. Submit proposed installation deviation from this specification to the RE/COR indicating the differences in the method of installation.
- C. The RE/COR reserves the right to have test portions of material installation removed to check for non-uniform adhesion and spotty adhesive coverage.
  - 1. Do not use solvents to remove adhesives.
  - 2. Prepare substrate as specified.

### **3.3 BASE INSTALLATION**

- A. Location:
  - 1. Unless otherwise specified or shown, where base is scheduled, install base over toe space of base of casework, lockers, and where other equipment occurs.
  - 2. Extend base scheduled for room into adjacent closet, alcoves, and around columns.
- B. Application:
  - 1. Apply adhesive uniformly with no bare spots.
  - 2. Set base with joints aligned and butted to touch for entire height.
  - 3. Before starting installation, layout base material to provide the minimum number of joints with no strip less than 600 mm (24 inches) length.
    - a. Short pieces to save material will not be permitted.
    - b. Locate joints as remote from corners as the material lengths or the wall configuration will permit.
- C. Form corners and end stops as follows:
  - 1. Score back of outside corner.
  - 2. Score face of inside corner and notch cove.
- D. Roll base for complete adhesion.

### **3.4 CLEANING AND PROTECTION**

- A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.
- B. Keep traffic off resilient material for at least 72 hours after installation.
- C. Clean and polish materials in the following order:

1. After two weeks, scrub resilient base, sheet rubber and treads materials with a minimum amount of water and a mild detergent. Leave surfaces clean and free of detergent residue. Polish resilient base to a gloss finish.
2. Do not polish tread and sheet rubber materials.
- D. When construction traffic is anticipated, cover tread materials with reinforced kraft paper and plywood or hardboard properly secured and maintained until removal is directed by the RE/COR.
- E. Where protective materials are removed and immediately prior to acceptance, replace damaged materials and re-clean resilient materials. Damaged materials are defined as having cuts, gouges, scrapes or tears and not fully adhered.

- - - END - - -

**SECTION 09 91 00  
PAINTING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Section specifies field painting and concrete floor sealer.
- B. Section specifies prime coats which may be applied in shop under other sections.
- C. Painting includes shellacs, stains, varnishes, and coatings specified.

**1.2 RELATED WORK**

- A. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS, Division 10 - SPECIALTIES, Division 11 - EQUIPMENT, Division 12 - FURNISHINGS, Division 13 - SPECIAL CONSTRUCTION, Division 21 - FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 - HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 - ELECTRONIC SAFETY AND SECURITY sections.
- B. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Before work is started, or sample panels are prepared, submit manufacturer's literature, the current Master Painters Institute (MPI) "Approved Product List" indicating 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 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 Product List" where applicable is acceptable.
- C. Samples:

1. After painters' materials have been approved and before work is started submit samples showing each type of finish and color specified.
2. Samples to show color: Composition board, 150 by 150 (6 inch by 6 inch).

D. Manufacturers' Certificates indicating compliance with specified requirements:

1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.

#### **1.4 DELIVERY AND STORAGE**

A. Deliver materials to site in manufacturer's sealed container marked to show following:

1. Name of manufacturer.
2. Product type.
3. Batch number.
4. Instructions for use.
5. Safety precautions.

B. In addition to manufacturer's label, provide a label legibly printed as following:

1. Federal Specification Number, where applicable, and name of material.
2. Surface upon which material is to be applied.
3. If paint or other coating, state coat types; prime, body or finish.

C. Maintain space for storage, and handling of painting materials and equipment in a neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.

D. Store materials at site at least 24 hours before using, at a temperature between 18 and 30 degrees C (65 and 85 degrees F).

#### **1.5 APPLICABLE PUBLICATIONS**

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

## B. American Conference of Governmental Industrial Hygienists (ACGIH):

1. ACGIH TLV-BKLT-2009 - Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
2. ACGIH TLV-DOC-2009 - Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)

## C. Steel Structures Painting Council (SSPC):

1. SSPC SP 1-04 - Solvent Cleaning
2. SSPC SP 2-04 - Hand Tool Cleaning
3. SSPC SP 3-04 - Power Tool Cleaning

**PART 2 - PRODUCTS****2.1 MATERIALS**

## A. Exterior Primer:

SUBSTARTE	TYPE	FRAZEE	DUNN-EDWARDS
CMU	Acrylic Block Filler Premium	262 Block Filler	W6329 Block Filler
Wood	100% Acrylic Multi-Purpose	168 Prime Plus	BIPRo-0 Block-It
Metal Ferrous	Acrylic	561 Acrylic Metal Prime	WBPR10 Syn Lustro Primer
Metal - Ferrous & Non-Ferrous	WB Alkyd Emulsion	661F774 Metal Prime (Not VOC Compliant)	BPROO-1 Bloc Rust

## B. Exterior Finishes:

FINISH	TYPE
Flat	100% Acrylic Premium Plus
Eggshell	100% Acrylic Premium Plus
Semi-Gloss	100% Acrylic Premium Plus
Clear-Penetrating	Siloxane
Semi-Transparent	Acrylic Stain
Solid Color	Acrylic Stain

## C. Interior Primers:

## PAINTING

Gypsum Board	Vinyl Acrylic Premium Plus	610701 Aqua Seal	VNPROO Vinylastic
Gypsum Board	Vinyl Acrylic Premium	065 PVA	W2397 Wall Sealer
Plaster	Vinyl Acrylic Premium Plus	065 PVA	W6232 Primer Sealer
Concrete	Vinyl Acrylic Premium	065 AcryPrime	IKPROO Inter-Kote
CMU	Acrylic Premium Plus	N/A	SBPROO/MBPROO Blockfil
Wood	100% Acrylic Premium Plus	168 Prime Plus	IKPROO Inter-Kote
Metal - Non-Ferrous	Pretreatment	Jasco Prep & Primer	ME01 Etch

## D. Interior Finishes:

SUBSTRATE	PRODUCT TYPE
Flat	Acrylic Premium Plus
Eggshell	100% Acrylic Premium Plus
Semi-Gloss	100% Acrylic Non-Blocking Premium Plus
Varnish Clear Stain	Acrylic Polyurethane

**2.2 CONCRETE FLOOR SEALER**

A. Concrete Sealer: Clear, penetrating, waterborne silicate compound designed to densify and seal concrete surfaces.

**2.3 PAINT PROPERTIES**

A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.

## PAINTING

B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

## **2.4 REGULATORY REQUIREMENTS**

A. Paint materials must conform to the restrictions of the local Environmental and Toxic Control jurisdiction or the requirements of this section, whichever is most stringent.

1. Lead-Based Paint:

- a. Lead based paint is not permitted to be used.
- b. For lead-paint removal, see Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.

2. Asbestos: Materials must not contain asbestos.

3. Chromate, Cadmium, Mercury, and Silica: Materials must not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.

4. Human Carcinogens: Materials must not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.

5. Use high performance acrylic paints in place of alkyd paints, where possible.

6. VOC content for solvent-based paints must not exceed specified performance requirement; aromatic hydro carbons contained in solvent-based paints must not exceed one percent by weight.

## **2.5 ACCESSORY MATERIALS**

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

**PART 3 - EXECUTION****3.1 JOB CONDITIONS**

A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.

1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day's work.

B. Atmospheric and Surface Conditions:

1. Do not apply coating when air or substrate conditions are:
  - a. Less than 3 degrees C (5 degrees F) above dew point.
  - b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the Contracting Officer and the product manufacturer.
2. Do not exceed application conditions recommended by the manufacturer.
3. Maintain interior temperatures until paint dries hard.
4. Do no exterior painting when it is windy and dusty.
5. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
6. Apply only on clean, dry and frost free surfaces except as follows:
  - a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces where allowed by manufacturer's printed instructions.
  - b. Dampened with a fine mist of water on hot dry days concrete and masonry surfaces to which water thinned acrylic and cementitious paints are applied to prevent excessive suction and to cool surface.
7. Varnishing:
  - a. Apply in clean areas and in still air.
  - b. Before varnishing vacuum and dust area.



- c. Immediately before varnishing wipe down surfaces with a tack rag.

### 3.2 SURFACE PREPARATION

A. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays.

B. General:

1. Remove prefinished items not to be painted such as lighting fixtures, escutcheon plates, hardware, trim, and similar items for reinstallation after paint is dried.
2. Remove items for reinstallation and complete painting of such items and adjacent areas when item or adjacent surface is not accessible or finish is different.
3. See other sections of specifications for specified surface conditions and prime coat.
4. Clean surfaces for painting with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry.

C. Wood:

1. Sand to a smooth even surface and then dust off.
2. Sand surfaces showing raised grain smooth between each coat.
3. Wipe surface with a tack rag prior to applying finish.
4. Surface painted with an opaque finish:
  - a. Coat knots, sap and pitch streaks with Knot Sealer before applying paint.
  - b. Apply two coats of Knot Sealer over large knots.
5. After application of prime or first coat of stain, fill cracks, nail and screw holes, depressions and similar defects with wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
7. Fill open grained wood such as oak, walnut, ash and mahogany with Wood Filler Paste, colored to match wood color.

- a. Thin filler in accordance with manufacturer's instructions for application.
- b. Remove excess filler, wipe as clean as possible, dry, and sand as specified.

D. Ferrous Metals:

1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning). Exception: where high temperature aluminum paint is used, prepare surface in accordance with paint manufacturer's instructions.
3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
  - a. This includes flat head countersunk screws used for permanent anchors.
  - b. Do not fill screws of item intended for removal such as glazing beads.
4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.

E. Zinc-Coated (Galvanized) Metal, Aluminum Surfaces Specified Painted:

1. Clean surfaces to remove grease, oil and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items with Organic Zinc Rich Coating. Prime or spot prime with MPI 134 (Waterborne Galvanized Primer) depending on finish coat compatibility.

**F. Masonry, Concrete, Cement Board, Cement Plaster and Stucco:**

1. Clean and remove dust, dirt, oil, grease efflorescence, form release agents, laitance, and other deterrents to paint adhesion.
2. Use emulsion type cleaning agents to remove oil, grease, paint and similar products. Use of solvents, acid, or steam is not permitted.
3. Remove loose mortar in masonry work.
4. Replace mortar and fill open joints, holes, cracks and depressions with new mortar specified in Section 04 05 13, MASONRY MORTARING Section 04 05 16, MASONRY GROUTING. Do not fill weep holes. Finish to match adjacent surfaces.
5. Neutralize Concrete floors to be painted by washing with a solution of 1.4 Kg (3 pounds) of zinc sulfate crystals to 3.8 L (1 gallon) of water, allow to dry three days and brush thoroughly free of crystals.
6. Repair broken and spalled concrete edges with concrete patching compound to match adjacent surfaces as specified in CONCRETE Sections. Remove projections to level of adjacent surface by grinding or similar methods.

**G. Gypsum Board:**

1. Remove efflorescence, loose and chalking plaster or finishing materials.
2. Remove dust, dirt, and other deterrents to paint adhesion.
3. Fill holes, cracks, and other depressions with CID-A-A-1272A Plaster, Gypsum (Spackling Compound) finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

**3.3 PAINT PREPARATION**

- A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
- B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
- C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.

**PAINTING**

- D. Mix two component and two part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.
- E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

### 3.4 APPLICATION

- A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
- B. Unless otherwise specified, apply paint in three coats; prime, body, and finish. When two coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
- C. Apply each coat evenly and cover substrate completely.
- D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by RE/COR.
- E. Finish surfaces to show solid even color, free from runs, lumps, brush marks, laps, holidays, or other defects.
- F. Apply by brush, roller or spray, except as otherwise specified.
- G. Do not spray paint in existing occupied spaces unless approved by RE/COR, except in spaces sealed from existing occupied spaces.
  - 1. Apply painting materials specifically required by manufacturer to be applied by spraying.
  - 2. In areas, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in WORK NOT PAINTED, motors, controls, telephone, and electrical equipment, fronts of sterilizes and other recessed equipment and similar prefinished items.
- H. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

### 3.5 EXTERIOR PAINTING

- A. After surface preparation, prime surfaces before application of body and finish coats, except as otherwise specified.

#### PAINTING

- B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.
- C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel. Apply an additional prime coat.
- D. Prime rebates for stop and face glazing of wood, and for face glazing of steel.
- E. Wood and Wood Particleboard:
  - 1. One coat of primer and two finish coats.
- F. Metals:
  - 1. Uncoated: One coat of primer and two finish coats.
  - 2. Pre-primed: Spot primer and two finish coats.
- G. Concrete Masonry Units except glazed or integrally colored and decorative units:
  - 1. One coat of primer and two finish coats.

### 3.6 INTERIOR PAINTING

- A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Metal Work:
  - 1. Ferrous Metal, Galvanized Metal, and Other Metals  
Scheduled: One coat of primer and two finish coats.
- C. Gypsum Board: One coat of primer and two finish coats.
- D. Plaster: One coat of primer and two finish coats.
- E. Masonry and Concrete Walls: One coat of primer and two finish coats.
- F. Wood:
  - 1. Sanding:
    - a. Use 220-grit sandpaper.
    - b. Sand sealers and varnish between coats.

### PAINTING

- c. Sand enough to scarify surface to assure good adhesion of subsequent coats, to level roughly applied sealer and varnish, and to knock off "whiskers" of any raised grain as well as dust particles.
- 2. Sealers:
  - a. Apply sealers specified except sealer may be omitted where pigmented, penetrating, or wiping stains containing resins are used.
  - b. Allow manufacturer's recommended drying time before sanding, but not less than 24 hours or 36 hours in damp or muggy weather.
  - c. Sand as specified.
- 3. Paint Finish: One coat of primer and two finish coats.
- 4. Transparent Finishes on Wood Except Floors.
  - a. Natural Finish: One coat sealer, 2 coats Polyurethane.
  - b. Stain Finish: One coat stain, one coat sealer, two coats polyurethane

### 3.7 REFINISHING EXISTING PAINTED SURFACES

- A. Clean, patch and repair existing surfaces as specified under surface preparation.
- B. Remove and reinstall items as specified under surface preparation.
- C. Remove existing finishes or apply separation coats to prevent non-compatible coatings from having contact.
- D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.
- E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.
- F. In existing rooms and areas where alterations occur, clean existing stained and natural finished wood retouch abraded surfaces and then

give entire surface one coat of Polyurethane, Moisture Cured, Clear Flat (PV) //.

- G. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.
- H. Coat knots and pitch streaks showing through old finish with Knot Sealer before refinishing.
- I. Sand or dull glossy surfaces prior to painting.
- J. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

### **3.8 PAINT COLOR**

- A. Color and gloss of finish coats is specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. For additional requirements regarding color see Articles, REFINISHING EXISTING PAINTED SURFACE and MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE.
- C. Coat Colors:
  - 1. Color of priming coat: Lighter than body coat.
  - 2. Color of body coat: Lighter than finish coat.
  - 3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.
- D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:
  - 1. Paint to match color of casework where casework has a paint finish.
  - 2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

### **3.9 PROTECTION CLEAN UP, AND TOUCH-UP**

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.
- C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

- - - END - - -

PAINTING

**SECTION 10 14 00  
EXTERIOR SIGNAGE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the work required to furnish and install the indicated and specified exterior cemetery site signage systems, including posts. The signage systems to be provided include all those shown on the drawings including, but not limited to: identification signs, directional signs, traffic and regulatory signs, and warning/informational signs like "DO NOT DRINK" and "NON-POTABLE WATER". Exterior signage shall also include the specialty casting or fabricating of stainless steel letters and numbers for the columbaria and memorial marker identification and numbering, the bronze seal of the Veterans Administration, bronze cemetery identification plaque.
- B. Signs shall be products of manufacturers regularly engaged in manufacturing signs of types specified.
- C. Signs included are as follows:
  - 1. Single post traffic regulatory signs.
  - 2. Cemetery rules and regulations signs
  - 3. Cast Bronze Wall-Mounted Cemetery Name with graphics as indicated in BAS relief.
  - 4. Stainless Steel Letters and Numbers for Columbarium Units and Memorial Marker enumeration.
  - 5. Identification Signs.
  - 6. Cast Bronze BAS relief Department of Veterans Affairs Seal as shown and specified.

**1.2 RELATED WORK**

- A. Post Setting Excavation, Material, Backfill, Section 31 20 00, EARTH MOVING.
- B. Concrete Bases for Posts: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- C. Precast Sign Posts: Section 04 72 00, CAST STONE MASONRY.

**1.3 MANUFACTURER'S QUALIFICATIONS**

- A. Sign manufacturer shall regularly and presently manufacture signs similar to those specified as one of their principal products. Sign manufacturer shall submit qualifications demonstrating a minimum of three years of experience manufacturing the qualifying signs and shall,



if possible, demonstrate the successful manufacturing of exterior site signs installed at one or more State or National Veteran Cemeteries.

#### **1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples: Submit 3 sets. One set to the Contractor, one set to the Resident Engineer/Contracting Officer's Representative (RE/COR) and one set to the A/E Designer.
  - 1. Aluminum panel samples showing full range of finish colors available.
  - 2. Cast Bronze Letter, of the styles, sizes and finishes indicated.
  - 3. Stainless steel cut letter and number, of the styles, sizes and finishes indicated.
  - 4. Vinyl letters in upper and lower case of font to be applied to aluminum sheet informational signs.
  - 5. Sample of typeface, arrow and symbols in a typical full size layout.
- C. Shop Drawings: All signs showing material, finish, colors, size of members, details of construction, letter and number spacing (kerning), size and type, numbers, symbols or image details, and mounting details. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.
- D. Manufacturer's Literature and Data (Mark literature to indicate items proposed to be furnished):
  - 1. Signs, each type. Manufacturer's printed specifications, anchorage details, installation and maintenance instructions. Manufacturer's recommendations for mounting the Sign Panels shall be provided.
  - 2. Coatings, for bronze cast letters. Manufacturer's printed specifications and MSDS information for air-dry lacquer to resist tarnishing.
- F. Manufacturer's Certificates: Provide certification from the coating installer, that they prepared the aluminum and applied the coating(s) to the specified thickness(es).

#### **1.5 DELIVERY AND STORAGE**

- A. Package to prevent damage or deterioration during shipment, handling, storage and installation. Maintain protective covering in place and in good repair until removal is necessary.
- B. Deliver signs only when the site, mounting materials, and equipment are ready for installation work to proceed.

- C. Store products in dry condition inside enclosed facilities prior to installation.

#### **1.6 WARRANTY**

- A. Sign Manufacturer shall guarantee text and symbols application to aluminum for an extended warranty period of five years.

#### **1.7 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Americans with Disabilities Act - 1990
- C. Federal Highway Administration  
Manuals on Uniform Traffic Control Devices for Street and Highways:  
Single Post Traffic Regulatory Signs.
- D. American Society for Testing and Materials (ASTM):
  - A480/A480M-16a                      Standard Specification for General Requirements  
for Flat-Rolled Stainless and Heat-Resisting  
Steel Plate, Sheet, and Strip
  - B209-14.....Aluminum and Aluminum-Alloy Sheet and Plate
  - B449-93(2015).....Standard Specification for Chromates on  
Aluminum
- E. American Architectural Manufacturer's Association (AAMA):
  - AAMA 2604.....Performance Requirements and Test Procedures  
for High Performance Organic Coatings on  
Aluminum extrusions and Panels.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. Signs shall be of type, size and design shown on the drawings and as specified.
- B. Signs shall be complete with lettering, support framing as necessary, and related components for a complete sign installation.
- C. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.
- D. Do not scale drawings for dimensions. Contractor to verify and be responsible for, all dimensions and conditions shown by these drawings. RE/COR to be notified of any discrepancy in drawing, in field directions or conditions, and/or of any changes required for all such construction details.

- E. The Sign Contractor, by commencing work of this section, assumes overall responsibility, as part of his warranty of work, to assure that assemblies, components and parts shown or required within the work of the section, comply with the Contract Documents. The Contractor shall further warrant: That all components, specified or required to satisfactorily complete the installation are compatible with each other and with conditions of installations.

## **2.2 SIGN STANDARDS**

### **A. Typography:**

1. Type Style: Optima Bold, Helvetica or Arial Bold or as shown in Contract Drawings. Initial caps or and lower case as indicated in Contract Drawings, unless otherwise indicated.
2. Arrow: See graphic standards in drawings.
3. Letter spacing: Per approved Shop Drawings, field verify final spacing and placement of Cast Bronze Letters.
4. All text, arrows, and symbols to be provided in size, colors, typefaces and letter spacing shown. Text shall be a true, clean, accurate reproduction of typeface(s) shown. Text as shown in drawings shall be for layout purposes only; final text for signs shall be as approved in the shop drawings.

- B. Sign Colors and Finishes: As specified and approved in the Shop Drawing & Submittal process.

## **2.3 SIGNS TYPES**

- A. General: The exterior sign system shall be comprised of sign type families that are identified by a letter and number which identify a particular group of signs. An additional number identifies a specific type of sign within that family, as indicated below:

1. Type A - Traffic Regulatory Signs, both non-traffic and code type as shown on the drawing details.
2. Type B - Directional Signs: Not Used.
3. Type C - Identification Signs, shall be as shown on the drawing details and shall be surface mounted cast bronze letters and symbols with integral mounting brackets or pins as indicated in the detail drawings. Identification signs shall include the Veterans Administration Seal.
4. Type D - Columbarium Identification Signs, shall be as shown on the drawing details and shall be inset stainless steel letters and

symbols with integral embedment pins as indicated in the detail drawings.

5. Type E - Prohibition Signs: Cemetery rules sign, and cemetery hours sign shall be as shown on the drawing details, and shall be opaque vinyl applied letters on aluminum panel substrate. Mounting to precast concrete posts shall be as detailed on the drawings.
6. Type F - Street Signs: Not Used.
7. 'DO NOT DRINK' and 'NON-POTABLE WATER' sign panels shall be coated aluminum signs with lettering and/or graphic symbol as shown on the drawing details. The graphic (if applicable) shall be a universal symbol, if possible. The design A/E, upon request, will provide a copy of the electronic drawing image, from the contract drawings, in DWG or PDF electronic file format. This file shall be modified as required by the sign manufacturer in his development of the final approved graphic for the sign.

B. Text and Graphics:

1. Types A, B, 'DO NOT DRINK' and 'NON-POTABLE WATER' signs:
  - a. Surface applied reflective white opaque vinyl letters, numbers and graphics shall be of a quality and life expectancy equal to or exceeding that for Engineering Grade 3M Scotchlite, unless otherwise noted.
  - b. Color shall be selected from the manufacturer's standard selection, during the submittal process. Font Type Style shall be Optima Bold, Helvetica or Arial Bold as approved during submittal review process for the project. Submittals shall be for each of the identified type styles as Contractor shall furnish and install whichever is selected during the submittal review process.

C. Post Signs:

1. Signs to be installed with direct burial precast architectural concrete shall be installed and mounted at the locations as indicated on the drawings.
2. Traffic regulatory signs shall be mounted on 50mm square (2-inch square) galvanized steel poles, height as shown on the drawings, Posts shall be pre-drilled on 25mm (1-inch) centers, all four sides, to facilitate sign panel installation. A separate galvanized steel anchor base shall be provided to facilitate break-away in the event of a vehicle impact.

## **2.4 FABRICATION**

- A. Design components to allow for expansion and contraction for a minimum material temperature range of 56 °C (100 °F), without causing buckling, excessive opening of joints or over stressing of adhesives, welds and fasteners.
- B. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern. Plane surfaces shall be smooth flat and without oil-canning, free of rack and twist. Maximum variation from plane of surface plus or minus 0.3 mm (0.015 inches). Restore texture to filed or cut areas.
- C. Level or straighten wrought work. Members shall have sharp lines and angles and smooth surfaces.
- D. Drill holes for bolts and screws. Conceal fastenings where possible. Exposed ends and edges mill smooth, with corners slightly rounded. Form joints exposed to weather to exclude water.
- E. All painted surfaces shall be properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface to be smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter, and other imperfections.
- F. Movable parts, including hardware, are to be cleaned and adjusted to operate as designed without binding or deformation of members. Doors and covers centered in opening or frame. All contact surfaces fit tight and even without forcing or warping components.
- G. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.
- H. Aluminum plate recesses and all exposed surfaces shall receive the acid etch finish. Aluminum plates installed in post recesses shall be installed prior to delivery to the site. Protect all surfaces from damage.
- I. No signs are to be manufactured until final sign message schedule and location review has been completed by the RE/COR & forwarded to Contractor.

## **2.5 ALUMINUM AND RELATED MATERIALS**

- A. Aluminum, Extruded: Fed. Spec. QQA-200-9, alloy 6063-T5, applicable as material.

- B. Aluminum, Sheet and Plate: ASTM B209
- C. Aluminum, Extrusions and Tubing: ASTM B221
- D. Zinc Chromate Primer: Fed. Spec. TT-P-645.

## **2.6 PROTECTION OF ALUMINUM**

- A. Isolate aluminum in contact with or fastened to dissimilar metals other than stainless steel, white bronze or other metals compatible with aluminum by one of the following:
  - 1. Painting the dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
  - 2. Placing an approved caulking compound, or a non-absorptive tape, or gasket between the aluminum and the dissimilar metal.
- B. Paint aluminum in contact with or built into mortar, concrete, or other masonry materials with bituminous paint or zinc chromate primer.

## **2.7 BRONZE PLAQUES**

- A. Furnish and install Department of Veteran Affairs Plaque in Bronze BAS relief as indicated on the contract drawings.
- B. Department of Veteran Affairs Bronze Plaque shall be of the sculpted bas-relief style, unless otherwise directed by the RE/COR., with the size and graphics matching that of previously approved plaques and as approved during the submittal review and approval process. The size, location and attachment for the plaque shall be as indicated on the drawings and as approved in the submittal process, incorporating adequate security features to reduce or deter theft.

## **2.8 CAST BRONZE CEMETERY IDENTIFICATION PLAQUE**

- A. Furnish and install a Cast Bronze, BAS Relief, Cemetery Identification Plaque as indicated on the Drawings and as approved in the submittal process, incorporating adequate security features to reduce or deter theft.

**2.9 LACQUER CLEAR COAT**

- A. Bronze letter and seal tarnish reducer. EPA compliant, UV resistant, solvent-based clear coat brass/bronze lacquer for protective treatment of cast letters prior to installation. Spray or dip application and air-dry.
- B. Brass/bronze lacquer shall be 14135 250 Clear NY Coat RFU as manufactured by G. J. Nikolas & Co., Inc., (708) 544-0320; or approved equal.

**2.10 CUT STAINLESS STEEL LETTERING**

- A. Individual plasma or water jet cut letters shall be of the size, style, and satin finish as indicated on the Drawings. In the finishing process ease all sharp edges and intersections.
  - 1. Stainless steel plate to be Type 304 or Type 316.
  - 2. Letter surface and edge finish to be satin.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Set work accurately, in alignment and where shown. Signs shall be plumb, level, free of rack and twist and set parallel or perpendicular as required to line and plane the surface.
- B. Signs shall be installed with direct burial of precast concrete post into concrete as shown on Contract Drawings.
- C. Protect aluminum in contact with dissimilar metals or mortar as specified in Paragraph 2.4.
- D. Furnish setting drawings and instructions for installation of anchors and for the positioning of items having anchors or sleeves to be built into construction. Provide temporary bracing for such items until permanent anchors are set.
- E. Provide anchoring devices and fasteners as shown and as necessary for securing signs to construction as specified.
- F. Utilize approved layout template for the installation of the cast metal lettering on the entry wall. Pins shall be securely anchored as detailed. Face of all lettering shall be in a constant plane, while at the same time minimizing the distance between the back of the letters and the stone wall. Maintain a minimum gap as detailed between the back of the letter and the face of the stone or concrete wall.
- G. Contractor will be responsible for verifying that behind each sign location there are no utility lines that will be affected by installation of signs. Any damage during installation of signs to

utilities will be the sole responsibility of the Contractor to correct and repair.

- H. Furnish inserts and anchoring devices which must be set in concrete or other material for installation of signs. Provide setting drawings, templates, instructions and directions for installation of anchorage devices which may involve other trades.

### **3.2 PLAQUE INSTALLATION**

- A. Install plaques as detailed on Contract Drawings and as follows:

- 1. For all plaques, a 1-inch diameter hole shall be drilled in the unit masonry or stone to receive the mounting pins. The plaque/emblems shall be attached with non-shrink grout placed into the holes with the plaques/emblems being set when the mortar is wet. Contractor shall hold the plaques until the mortar has set. The plaques shall be set no more than 1/4 inch from the mounting substrate and shall be set plumb. A template of the mounting pins shall be made for each installation and the locations transferred to the masonry or stone substrate and locations approved by the owner's designated representative before the mounting holes are drilled.

### **3.3 CLEANING**

- A. After installation, all items shall be cleaned as recommended by the manufacturer and protected from damage until completion of the project.

### **3.4 PROTECTION**

- A. Protect finished surfaces from damage during fabrication, erection and after completion of the work.

- - -END- - -



**SECTION 10 21 13  
TOILET COMPARTMENTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies solid phenolic toilet partitions, and urinal screens.

**1.2 RELATED WORK**

- A. Overhead structural steel supports for ceiling hung pilasters: Section 05 50 00, METAL FABRICATIONS.
- B. Color of baked enamel finish: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Grab bars and toilet tissue holders: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.

**1.5 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Specified items indicating all hardware and fittings, material, finish, and latching.
- C. Shop Drawings: Construction details at 1/2 scale, showing installation details, anchoring and leveling devices.
- D. Manufacturer's certificate, attesting that zinc-coatings conform to specified requirements.

**1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American National Standards Institute (ANSI):
- |                    |  |
|--------------------|--|
| ICC/ANSI A117.1-03 | Guideline for Accessible and Usable Buildings and Facilities-Providing Accessibility and Usability for Physically Handicapped People |
|--------------------|--|
- C. American Society for Testing and Materials (ASTM):
- |               |   |
|---------------|---|
| A123/A123M-12 | Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products |
| A385/A385M-11 | High Quality Zinc Coatings (Hot-Dip)                          |

**PART 2 - PRODUCTS****2.1 FABRICATION**

- A. Solid phenolic: water resistant; graffiti resistant; non-absorbent; contain a minimum 30 percent post-consumer recycled plastic; Class C flame spread rating.
- B. Conform to ICC A117.1 code for access for the handicapped operation of toilet compartment door and hardware.
- C. Fabricate to dimensions shown or specified.
- D. Toilet Enclosures:
  - 1. Type 1, Style B (Ceiling hung).
  - 2. Reinforce panels shown to receive toilet tissue holders or grab bars.
  - 3. Provide sound deadening consisting of treated kraft paper honeycomb cores with a cell size of not more than 25 mm (1 inch); resin-material content minimum 11 percent of the finished core weight. Face expanded cores with kraft paper on both sides.
  - 4. Upper pivots and lower hinges adjustable to hold doors open 30 degrees.
  - 5. Keeper:
    - a. U-slot to engage bar of throw latch.
    - b. Combined with rubber bumper stop.
  - 6. Wheelchair Toilets:
    - a. Upper pivots and lower hinges to hold out swinging doors in closed position.
    - b. Provide U-type doors pulls, approximately 100 mm (four inches) long on pull side.
  - 7. Finish:
    - a.
    - b. Solid phenolic for doors, pilasters, and enclosure panels.//
- E. Urinal Screens:
  - 1. Type III, Style D (wall hung), stainless steel.
    - a. With integral flanges and continuous, full height wall anchor plate.
    - b. Option: Full height U-Type bracket.
    - c. Wall anchor plate drilled for 4 anchors on both sides of screen.
  - 2. Screen 600 mm (24 inches) wide and 1060 mm (42 inches high).

**2.2 ANCHORING DEVICES AND FASTENERS**

- A. Provide steel anchoring devices and fasteners hot-dipped galvanized after fabrication, in conformance with ASTM A385/A385M and ASTM A123/A123M. Conceal all galvanized anchoring devices.

**PART 3 - EXECUTION****3.1 INSTALLATION**

A. General:

1. Install in rigid manner, straight, plumb and with all horizontal lines level.
2. Conceal evidence of drilling, cutting and fitting in finish work.
3. Use hex-bolts for through-bolting.
4. Adjust hardware and leave in freely working order.
5. Clean finished surfaces and leave free of imperfections.

B. Panels and Pilasters:

1. Support panels, except urinal screens, and pilaster abutting building walls near top and bottom by stirrup supports secured to partitions with through-bolts.
2. Secure stirrups to walls with two suitable anchoring devices for each stirrup.
3. Secure panels to faces of pilaster near top and bottom with stirrup supports, through-bolted to panels and machine screwed to each pilaster.
4. Secure edges of panels to edges of pilasters near top and bottom with "U" shaped brackets.

C. Urinal Screens:

1. Anchor urinal screen flange to walls with minimum of four bolts both side of panel.
2. Space anchors at top and bottom and equally in between.

- - - E N D - - -

**SECTION 10 28 00  
TOILET AND BATH ACCESSORIES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies manufactured items usually used in toilets, and at sinks in related spaces.
- B. Items Specified:
  - 1. Waste receptacles.
  - 2. Toilet tissue dispenser.
  - 3. Grab Bars: (10800-1.DWG).
  - 4. Metal framed mirror: (10800-7.DWG).
  - 5. Soap dishes.
  - 6. Sanitary napkin disposal.
  - 7. Toilet seat cover dispenser.
  - 8. Electric hand dryer.
  - 9. Mop racks.
- C. This section also specifies custom fabricated items used in toilets and related spaces.

**1.2 RELATED WORK**

- A. Color of finishes: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Color of vinyl fabric: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
  - 1. Provide for each product specified.
  - 2. Show material and finish, size of members, and details of construction, installation and anchorage of mop racks.
- C. Samples:
  - 1. One of each type of accessory specified.
  - 2. After approval, samples may be used in the work.
- D. Manufacturer's Literature and Data:
  - 1. Provide for all accessories specified.
  - 2. Show type of material, gages or metal thickness in inches, finishes, and when required, capacity of accessories.

3. Show working operations of spindle for toilet tissue dispensers.

E. Manufacturer's Certificates:

1. Attest that soap dispensers are fabricated of material that cannot be affected by liquid soap or aseptic detergents, Phisohex and solutions containing hexachlorophene.
2. Confirm that anodized finish is as specified.

**1.4 QUALITY ASSURANCE**

- A. Each product must meet the requirements specified and be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- B. Each accessory type to be the same and be made by the same manufacturer.
- C. Assemble each accessory to the greatest extent possible before delivery to the site.
- D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

**1.5 PACKAGING AND DELIVERY**

- A. Pack accessories individually to protect finish.
- B. Deliver accessories to the project only when installation work in rooms is ready to receive them.
- C. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- D. Deliver products to site in sealed packages of containers; labeled for identification with manufacturer's name, brand, and contents.

**1.6 STORAGE**

- A. Store products in weathertight and dry storage facility.
- B. Protect from damage from handling, weather and construction operations before, during and after installation in accordance with manufacturer's instructions.

**1.7 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and

recommendations of the following, except as otherwise shown or specified.

B. American Society for Testing and Materials (ASTM):

1. A167-99(2009) - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
2. A176-99(2009) - Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
3. A269-10 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service
4. A312/A312M-13 - Seamless and Welded Austenitic Stainless Steel Pipes
5. A653/A653M-11 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
6. A1011/A1011M-12 - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
7. B456-11e1 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
8. C1036-11e1 - Flat Glass
9. D635-10 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
10. D3690-02(2009) - Vinyl-Coated and Urethane-Coated Upholstery Fabrics - Indoor
11. F446-85(2009) - Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area

C. American Welding Society (AWS):

1. D10.4-86 (R2000) - Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing

D. The National Association of Architectural Metal Manufacturers (NAAMM):

1. AMP 500 Series - Metal Finishes Manual
2. AMP 500-505-06 - Metal Finishes Manual and Finishes for Stainless Steel

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Stainless Steel:
  - 1. Plate or sheet: ASTM A167, Type 302, 304, or 304L, except ASTM A176 where Type 430 is specified, 0.0299-inch thick unless otherwise specified.
  - 2. Tube: ASTM A269, Type 304 or 304L.
- B. Stainless Steel Tubing: ASTM A269, Grade 304 or 304L, seamless or welded.
- C. Stainless Steel Pipe: ASTM A312; Grade TP 304 or TP 304L.
- D. Steel Sheet: ASTM A653, zinc-coated (galvanized) coating designation G90.
- E. Glass: ASTM C1036, Type 1, Class 1, Quality q2, for mirrors.

**2.2 FASTENERS**

- A. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
- B. Concealed Fasteners: Steel, hot-dip galvanized/.
- C. Toggle Bolts: For use in hollow masonry or frame construction.
- D. Hex Bolts: For through bolting on thin panels.
- E. Expansion Shields: Lead or plastic as recommended by accessory manufacturer for component and substrate for use in solid masonry or concrete.
- F. Screws:
  - 1. ASME B18.6.4.
- G. Adhesive: As recommended by manufacturer for products to be joined.

**2.3 FINISH**

- A. In accordance with NAAMM AMP 500 series.
- B. AA-M32 Mechanical finish, medium satin.
  - 1. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.
  - 2. Stainless Steel: NAAMM AMP 503, finish number 4.
  - 3. Ferrous Metal:
    - a. Shop Prime: Clean, pretreat and apply one coat of primer and bake.

- b. Finish: Over primer apply two coats of alkyd or phenolic resin enamel, and bake.
- 4. Nylon Coated Steel: Nylon coating powder formulated for a fluidized bonding process to steel to provide a hard smooth, medium gloss finish, not less than 0.3 mm (0.012-inch) thick, rated as self-extinguishing when tested in accordance with ASTM D635.

#### **2.4 FABRICATION - GENERAL**

- A. Perform welding in accordance AWS D10.4.
- B. Grind dress, and finish welded joints to match finish of adjacent surface.
- C. Form exposed surfaces from one sheet of stock, free of joints.
- D. Provide steel anchors and components required for secure installation.
- E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents. Reinforce doors to prevent warp or twist.
- F. Shop assemble accessories and package with all components, anchors, fittings, fasteners and keys.
- G. Key items alike.
- H. Provide templates and rough-in measurements as required.
- I. Round and smooth edges of sheets to remove sharp edges.

#### **2.5 WASTE RECEPTACLES**

- A. Surface mounted type, without doors.
- B. Fabricate of stainless steel.
- C. Form face frame from one piece.
- D. Provide removable waste receptacle of approximately (12 gallon) capacity, fabricated of stainless steel.
- E. Waste receptacle key locked in place.

#### **2.6 TOILET TISSUE DISPENSERS**

- A. Double roll surface mounted type.
- B. Mount on continuous back plate.
- C. Removable spindle ABS plastic or chrome plated plastic.
- D. Wood rollers are not acceptable.

#### **2.7 GRAB BARS**

- A. Comply to ASTM F446.



- B. Fabricate of stainless steel or nylon coated steel, except use only one type throughout the project:
  - 1. Stainless Steel: Grab bars, flanges, mounting plates, supports, screws, bolts, and exposed nuts and washers.
- C. Concealed mount, except grab bars mounted at floor, swing up and on metal toilet partitions.
- D. Bars:
  - 1. Fabricate from 32 mm (1-1/4 inch) outside diameter tubing.
    - a. Stainless steel, minimum 1.2 mm (0.0478 inch) thick.
  - 2. Fabricate in one continuous piece with ends turned toward walls, except swing up and where grab bars are shown continuous around three sides of showers, bars may be fabricated in two sections, with concealed slip joint between.
  - 3. Continuous weld intermediate support to the grab bar.
- E. Flange for Concealed Mounting:
  - 1. Minimum of 2.65 mm (0.1046 inch) thick, approximately 75 mm (3 inch) diameter by 13 mm (1/2 inch) deep, with provisions for not less than three set screws for securing flange to back plate.
  - 2. Insert grab bar through center of the flange and continuously weld perimeter of grab bar flush to back side of flange.
- F. Instead of providing flange for concealed mounting, and back plate as specified, grab rail may be secured by being welded to a back plate and be covered with flange.
- G. Back Plates:
  - 1. Minimum 2.65 mm (0.1046 inch) thick metal.
  - 2. Fabricate in one piece, approximately 6 mm (1/4 inch) deep, with diameter sized to fit flange. Provide slotted holes to accommodate anchor bolts.
  - 3. Furnish spreaders, through bolt fasteners, and cap nuts, where grab bars are mounted on metal partitions.

## **2.8 METAL FRAMED MIRRORS**

- A. Mirror Glass:
  - 1. Minimum 6 mm (1/4 inch) thick.
  - 2. Set mirror in a protective vinyl glazing tape.
- B. Frames:

1. Channel or angle shaped section with face of frame not less than 9 mm (3/8 inch) wide. Fabricate with square corners.
2. Use 0.9 mm (0.0359 inch) thick stainless steel.
3. Filler:
  - a. Where mirrors are mounted on walls having ceramic tile wainscots not flush with wall above, provide fillers at void between back of mirror and wall surface.
  - b. Fabricate fillers from same material and finish as the mirror frame, contoured to conceal the void behind the mirror at sides and top.

C. Back Plate:

1. Fabricate back plate for concealed wall hanging of zinc-coated or cadmium plated 0.9 mm (0.036 inch) thick sheet steel, die cut to fit face of mirror frame, and furnish with theft resistant concealed wall fastenings.
2. Use set screw type theft resistant concealed fastening system for mounting mirrors.

D. Mounting Bracket:

1. Designed to support mirror tight to wall.
2. Designed to retain mirror with concealed set screw fastenings.

## **2.9 SOAP DISHES**

A. Class 1, Surface Mounted:

1. One piece with provisions for exposed fasteners.
2. Fabricate from chromium plated brass approximately 115 by 95 mm (4 1/2 by 3-3/4 inches) overall size with drainage openings at bottom.

## **2.10 SANITARY NAPKIN DISPOSAL**

- A. Fabricate a Type 304 stainless steel sanitary napkin disposal with removable leak-proof receptacle for disposable liners.
- B. Provide 50 disposable liners of the type standard with the manufacturer.
- C. Retain receptacle in cabinet by tumbler lock.
- D. Provide disposal with a door for inserting disposed napkins, surface mounted.

**2.11 TOILET SEAT COVER DISPENSER**

- A. Provide Type 304 stainless steel with surface mounted toilet seat cover dispensers. Provide dispenser with a minimum capacity of 500 seat covers.

**2.12 ELECTRIC HAND DRYER**

- A. Provide wall mount and electric hand dryer designed to operate at 110/125 volts, 60 cycle, single phase alternating current with a heating element core rating of a maximum 2100 watts.
- B. Provide dryer housing of single piece construction and of white porcelain enamel.
- C. Submit 4 complete copies of maintenance instructions listing routine maintenance procedures and possible breakdowns; include repair instructions for simplified wiring and control diagrams and other information necessary for unit maintenance.

**2.13 MOP RACKS**

- A. Minimum 1.0M (40 inches) long with five holders.
- B. Clamps:
  - 1. Minimum of 1.3 mm (0.050-inch) thick stainless steel bracket retaining channel with a hard rubber serrated cam; pivot mounted to channel.
  - 2. Provide clamps to hold handles from minimum 13 mm (1/2-inch) to 32 mm maximum (1-1/4 inch) diameter.
- C. Support:
  - 1. Minimum of 1 mm (0.0375 inch) thick stainless steel hat shape channel to hold clamps away from wall as shown.
  - 2. Drill wall flange for 3 mm (1/8 inch) fasteners above and below clamp locations.
- D. Secure clamps to support with oval head machine screws or rivets into continuous reinforcing back of clamps.
- E. Finish on stainless Steel: AMP 503-No. 4.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. Before starting work notify RE/COR in writing of any conflicts detrimental to installation or operation of units.

- B. Verify with the RE/COR the exact location of accessories.

### **3.2 INSTALLATION**

- A. Set work accurately, in alignment and where shown; plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Toggle bolt to steel anchorage plates in frame partitions or hollow masonry. Expansion bolt to concrete or solid masonry.
- C. Install accessories in accordance with the manufacturer's printed instructions and ASTM F446.
- D. Install accessories plumb and level and securely anchor to substrate.
- E. Install accessories in a manner that will permit the accessory to function as designed and allow for servicing as required without hampering or hindering the performance of other devices.
- F. Position and install dispensers, and other devices in countertops, clear of drawers, permitting ample clearance below countertop between devices, and ready access for maintenance as needed.
- G. Align mirrors, dispensers and other accessories even and level, when installed in battery.
- H. Install accessories to prevent striking by other moving, items or interference with accessibility.

### **3.3 CLEANING**

- A. After installation, clean as recommended by the manufacturer and protect from damage until completion of the project.

- - - END - - -

**SECTION 12 93 10  
GRANITE SITE FURNISHINGS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies requirements for fabrication and installation of granite benches, granite bollards and granite for use at flower watering stations.

**1.2 RELATED WORK**

- A. Section 03 30 53, SHORT FORM CAST-IN-PLACE CONCRETE.  
B. Section 04 05 13, MASONRY MORTARING.  
C. Section 04 05 16, MASONRY GROUTING.  
D. Section 04 43 00, CUT STONE.  
E. Section 07 92 00, JOINT SEALANTS.

**1.3 REFERENCES**

- A. ASTM C 119-04: Terminology Relating to Dimension Stone.  
B. ASTM C 170-90 (1999): Test Method for Compressive Strength of Dimension Stone.  
C. ASTM C 615-03: Specification for Granite Dimension Stone.  
D. ASTM C 880-98: Test Method for Flexural Strength of Dimensional Stone.

**1.4 SUBMITTALS**

- A. Product Data: For each stone type and each manufactured product shown on Drawings or specified.
1. For each stone variety used on Project, include physical property data.
- B. Shop Drawings: Show fabrication and installation details for stone:
1. Include dimensions and profiles of stone units, and dimension of reveal cuts.
- C. Samples: Submit samples for each stone type required, exhibiting the full range of color characteristics expected.
1. Submit a minimum of 2 pieces of each stone, 304 mm x 304 mm (12 inches x 12 inches) in size, in each color and finish specified.
  2. Mortar Samples: Full range of exposed color and texture.
  3. Sealant Samples: For each type and color of joint sealant required.
- D. Preliminary Test Reports: Submit test reports for proposed stones prior to final stone selection. Preliminary test reports shall be indicative of the stone to be proposed for the project.
1. Testing of production stone is required in addition to preliminary test reports.

- E. Certification: Submit a letter of certification from the stone fabricator, stating the material being furnished is the specified material and there are sufficient reserves available to supply the project and furnish replacements if needed.
- F. Material Test Reports: From a qualified independent testing agency, provide reports for each stone type.

### **1.5 QUALITY ASSURANCE**

- A. Source Limitations for Stone: Obtain each stone variety from a single quarry. All stone shall be obtained from quarries within the United States of America, having adequate capacity and facilities to meet the specified requirements. Cutting and finishing shall be done by a manufacturer equipped to process the material promptly and in strict accordance with these specifications. Characteristics of granite quarried from Raymond, CA.
- B. Installer Qualifications: Engage experienced installer that has completed stone installation similar in material, design, and extent to that indicated for the project.
- C. Fabricator Qualifications: Engage experienced fabricator that has completed stone fabrication similar in material, design, and extent to that indicated for the project.
- D. Preconstruction Stone Testing: Engage an independent testing agency to perform the following testing for each stone variety:
  - 1. Furnish test specimens that are representative of materials.
  - 2. Physical Property Tests: ASTM standards specified for stone type.
  - 3. Flexural Strength Tests: ASTM C 880

## **PART 2 - PRODUCTS**

### **2.1 STONE SOURCE**

- A. Varieties and Source: Subject to compliance with requirements, provide stone from the following source:
  - 1. Granite Source: Cold Spring Granite Company, or approved equal.
  - 2. Color: Sierra White
  - 3. Finish: All exposed faces, Diamond 8.
- B. Each color of stone shall come from a single quarry, with sufficient reserves to satisfy the requirements of the project. The granite supplier shall have the capabilities to cut and finish the stone without delaying the project.

- C. Stone Source Examination: Make quarried blocks available for examination by Architect.

## **2.2 STONE MATERIAL**

- A. Granite: ASTM C 615.  
B. Cut stone from one block or contiguous, matched blocks in which natural markings occur.

## **2.3 MORTAR MATERIALS**

- A. Portland Cement: ASTM C 150, Type I or Type II, except Type III may be used for cold-weather construction.  
B. Hydrated Lime: ASTM C 207.  
C. Portland Cement-Lime Mix: ASTM C 150, Type I or Type III, and ASTM C 207.  
D. Aggregate: ASTM C 144.  
E. Mortar Pigments: Natural and synthetic iron oxides. Use only pigments with a record of satisfactory performance in mortar and containing no carbon black.  
F. Water: Potable.  
G. Nonshrink, Nonmetallic Grout: ASTM C 1107; recommended in writing by manufacturer, for exterior applications.

## **2.4 ANCHORS AND FASTENERS**

- A. Anchor Material: Stainless steel, ASTM A 666, Type 304.  
B. Dowels and Pins Material: Stainless steel, ASTM A 276, Type 304.

## **2.5 STONE SITE FURNISHINGS**

- A. Granite Benches:  
1. Color, finish and manufacturer: Stone Type C: Sierra White Granite, Diamond 8 finish, manufactured by Cold Spring Granite, or approved equal. Thickness and physical dimensions as indicated on the drawings.
- B. Granite Water Spigot Pedestal at Flower Watering Stations:  
1. Color, finish and manufacturer: Stone Type C, Sierra White granite, Diamond 8 finish, by Cold Spring Granite, or approved equal. Thickness and physical dimensions as indicated on the drawings.
- C. Granite Bollards:  
1. Color, finish and manufacturer: Stone Type C: Sierra White Granite, Diamond 8 finish, manufactured by Cold Spring Granite, or approved equal. Thickness and physical dimensions as indicated on the drawings.

## 2.6 STONE FABRICATION

- A. Fabricate stone per requirements, as shown on Drawings, and as follows:
  - 1. Granite Fabrication: Comply with NBGQA's "Specifications for Architectural Granite."
- B. Arises: Remove the sharp edge from arises to slightly blunt edge and to reduce chipping of the finished edge.
- C. Dress joints straight and at 90 degree angle to face. Shape beds to fit supports.
- D. Anchor Provision: Cut and drill sink provisions and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone in place.
- E. Allow room for expansion of the anchoring devices where necessary.
- F. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match final samples.
- G. Joint Width: Cut stone to produce uniform joints as shown on Drawings.
- H. Provide reveals, reglets, openings, carve-outs, and similar features as required to accommodate adjacent work or work to be fitted within stone module, e.g. flower watering station plumbing.
- I. Fabricate molded work, including washes and drips, to produce uniform stone shapes, with precisely formed arises slightly eased, and matching profile at joints between units.
- J. Inspect finished stone units at fabrication plant. Replace defective units.
- K.
  - 1. Stone thicknesses greater than 2 inches: Plus or minus 1/8 inch of the nominal thickness.
  - 2. Overall face size: Plus or minus 1/16 inch in both height and width
  - 3. Out of square: Plus or minus 1/16 inch difference of diagonals.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions for compliance with requirements for correct and level finished grade, mounting surfaces and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.



### **3.2 INSTALLATION, GENERAL**

- A. Comply with manufacturer's written installation instructions. Complete field assembly of site furnishings where required.
- B. Install site furnishings level, plumb, true, and located at locations shown on Drawings.

### **3.3 CLEANING**

- A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

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