

100% Construction Documents Submittal:

Technical Specifications

February 23, 2022

Department of Veterans Health Administration

Electronic Health Record Modernization (EHRM) Infrastructure
Upgrades – Hot Spring, SD

Contract No. 36C776210069

Black Hills Health Care System

Hot Spring Campus

500 N. 5th Street

Hot Springs, SD 57747

US Department of Veterans Affairs

Program Contracting Activity Central (PCAC)

6150 Oak Tree Blvd., Suite 300

Independence, OH 44131



Prepared by:

GDM of Oregon



1000 W Steuben Street, Unit 3

Bingen, WA 98605

Volume 1

Divisions 1 - 13

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 00 01 10
TABLE OF CONTENTS

THE SPECIFICATIONS LISTED BELOW FORM A PART OF THE CONTRACT.

DIVISION 00 - SPECIAL SECTIONS		# of Pages
00 01 10	Table of Contents.....	4
00 01 15	List of Drawing Sheets.....	
	(See Index Included with Drawings)	
DIVISION 01 - GENERAL REQUIREMENTS		
01 00 00	General Requirements.....	36
01 32 16	Project Schedules.....	10
01 33 23	Shop Drawings, Product Data, and Samples.....	8
01 35 26	Safety Requirements.....	37
01 42 19	Reference Standards.....	9
01 45 00	Quality Control.....	12
01 45 29	Testing Laboratory Services.....	17
01 15 00	Temporary Facilities and Controls.....	4
01 57 19	Temporary Environmental Controls.....	8
01 74 19	Construction Waste Management.....	8
01 81 13	Sustainable Construction Requirements.....	8
01 91 00	General Commissioning Requirements.....	46
DIVISION 02 - EXISTING CONDITIONS		
02 41 00	Selective Demolition.....	4
02 81 00	Transportation and disposal of Hazardous Materials.....	11
02 82 00	Asbestos Remediation.....	52
02 83 00	Lead Remediation.....	27
02 84 16	Handling of Lighting Ballasts and Lamps Containing PCBs and Mercury.....	8
DIVISION 03 - CONCRETE		
03 15 00	Expansion Joint Filler.....	35

03 30 00	Cast-in-Place Concrete.....	35
DIVISION 04 - MASONRY		
04 20 05	Brick Unit Masonry.....	5
DIVISION 05 - METALS		
05 12 00	Structural Steel Framing.....	06
05 31 00	Steel Decking.....	08
05 36 00	Composite Metal Decking.....	08
05 40 00	Cold-Formed Metal Framing.....	8
05 50 00	Metal Fabrications.....	8
DIVISION 06 - WOOD, PLASTICS AND COMPOSITES		
06 10 00	Rough Carpentry.....	10
06 20 00	Finish Carpentry.....	4
DIVISION 07 - THERMAL AND MOISTURE PROTECTION		
07 21 00	Thermal Insulation.....	6
07 21 00.10	Roof Insulation Baffles and Vents.....	4
07 31 19	Fiber Cement Wall Panels.....	6
07 42 10.10	Composite Framing Support System.....	10
07 50 05	Roof Systems.....	6
07 51 13.13	Cold-Applied Built-Up Asphalt Roofing.....	6
07 53 23.15	Ethylene-Propylene-Diene-Monomer Roof (EPDM) System) Patching.....	8
07 62 00	Sheet Metal Flashing and Trim.....	8
07 71 00	Roof Specialties.....	7
07 81 00	Applied Fire Protection.....	8
07 84 00	Firestopping.....	7
07 92 00	Joint Sealants.....	9
DIVISION 08 - OPENINGS		
08 11 10	Hollow Metal Doors and Frames.....	8
08 14 16	Flush Wood Veneer Doors.....	6

08 31 13	Access Doors and Frames.....	6
08 34 00.10	Aisle Containment Curtain.....	3
08 34 53	Security Doors AND Frames.....	8
08 41 13	Aluminum Framed Entrances and Storefronts...	11
08 71 00	Door Hardware.....	14
08 90 00	Louvers and Vents.....	6

DIVISION 09 - FINISHES

09 05 16	Subsurface Preparation for Floor Finishes.....	3
09 06 00	Schedule for Finishes.....	2
09 22 16	Non-Structural Metal Framing.....	6
09 29 00	Gypsum Board.....	6
05 51 13	Acoustical Panel Ceilings.....	10
09 65 13	Resilient Base.....	3
09 65 36	Static Dissipative Resilient Flooring.....	6
09 69 00	Access Flooring.....	20
09 91 00	Painting.....	10

DIVISION 10 - SPECIALTIES

10 14 00	Signage.....	6
10 44 13	Fire Extinguisher Cabinets.....	2

DIVISION 11 - EQUIPMENT (NOT USED)

DIVISION 12 - FURNISHINGS (NOT USED)

DIVISION 13 - SPECIAL CONSTRUCTION

13 05 41	Seismic Restraint Requirements for Non- Structural Components.....	8
----------	---	---

DIVISION 14- CONVEYING EQUIPMENT (NOT USED)

DIVISION 21- FIRE SUPPRESSION

21 13 13	Wet-Pipe Sprinkler System Modifications.....	5
21 13 45	Sprinkler Guards.....	2
21 22 00	Clean Agent Fire Suppression System.....	20

DIVISION 22 - PLUMBING

22 05 11	Common Work Results for Plumbing.....	32
22 05 23	General-Duty Valves for Plumbing Piping.....	8
22 07 11	Plumbing Insulation.....	10
22 08 00	Commissioning of Plumbing Systems.....	4
22 11 00	Facility Water Distribution.....	10
22 13 00	Facility Sanitary and Vent Piping.....	12
22 14 00	Facility Storm Drainage.....	14
DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)		
23 05 11	Common Work Results for HVAC.....	34
23 05 12	General Motor Requirements for HVAC and Steam Generation Equipment.....	10
23 05 41	Noise and Vibration Control for HVAC Piping and Equipment.....	8
23 05 93	Testing, Adjusting, and Balancing for HVAC.....	10
23 07 11	HVAC and Boiler Plant Insulation.....	14
23 08 00	Commissioning of HVAC Systems.....	6
23 09 23	Direct-Digital Control System for HVAC.....	38
23 10 00	Facility Fuel Oil Systems.....	12
23 23 00	Refrigerant Piping.....	10
23 31 00	HVAC Ducts and Casings.....	12
23 37 00	Air Outlets and Inlets.....	6
23 81 00	Decentralized Unitary HVAC Equipment.....	14
23 81 23	Computer-Room Air-Conditioners.....	51
DIVISION 25 - INTEGRATED AUTOMATION (NOT USED)		
DIVISION 26 - ELECTRICAL		
26 05 11	Requirements for Electrical Installations..	14
26 05 19	Low-Voltage Electrical Power Conductors and Cables.....	11
26 05 26	Grounding and Bonding for Electrical Systems.....	10

26 05 33	Raceway and Boxes for Electrical Systems.....	8
26 05 41	Underground Electrical Construction.....	12
26 05 73	Overcurrent Protective Device Coordination Study.....	6
26 24 16	Panel Boards.....	8
26 25 11	Busways.....	6
26 27 26	Wiring Devices.....	10
26 29 21	Enclosed Switches and Circuit Breakers.....	8
26 32 13	Engine Generators.....	23
26 33 53	Static Uninterruptible Power Supply.....	26
26 36 23	Automatic Transfer Switches.....	13
26 41 00	Facility Lightning Protection.....	5
26 43 13	Surge Protective Devices.....	4
26 51 00	Interior Lighting.....	10

DIVISION 27 - COMMUNICATIONS

27 05 11	Requirements for Communications and Installations.....	52
27 05 26	Grounding and Bonding for Communication Systems.....	6
27 05 33	Conduits and Backboxes for Communications Systems.....	12
27 05 36	Cable Trays for Communications Systems.....	3
27 05 53	Identification for Communications Systems.....	2
27 08 00	Commissioning of Communications Systems.....	4
27 10 00	Structured Cabling.....	5
27 11 00	Telecommunications Room Fittings.....	16
27 11 16	Communications Cabinets, Racks, Frames, and Enclosures.....	5
27 11 19	Communications Termination Blocks and Patch Panels.....	4

27 11 26	Communications Rack Mounted Power Protection and Power Strips.....	4
27 13 13	Communications Copper Backbone Cabling.....	2
27 13 13.13	Communications Copper Cable Splicing and Terminations.....	2
27 13 23	Communications Optical Fiber Backbone Cabling.....	3
27 15 00	Communications Structured Cabling.....	14
27 15 13	Communications Copper Horizontal Cabling....	2
27 15 13.13	Communications Optical Fiber Splicing and Terminations.....	1
27 16 19	Communications Patch Cords, Station Cords, and Cross Connect Wire.....	2
DIVISION 28 - ELECTRONIC SAFETY AND SECURITY		
28 08 00	Commissioning of Electronic Safety and Security Systems.....	4
28 13 00	Physical Access Control System.....	74
DIVISION 31 - EARTHWORK		
31 20 00	Earthwork.....	20
31 23 23.33	Flowable Fill.....	8
DIVISION 32 - EXTERIOR IMPROVEMENTS		
32 05 23	Concrete for Exterior Improvements.....	15
32 12 16	Asphalt Paving.....	8
32 17 23	Pavement Markings	8
32 90 05	Turfgrass Sodding.....	5
DIVISION 33 - UTILITIES (NOT USED)		
DIVISION 34 - TRANSPORTATION (NOT USED)		
DIVISION 48 - ELECTRICAL POWER GENERATION (NOT USED)		

- - - E N D - - -

SECTION 01 00 00
GENERAL REQUIREMENTS

GENERAL

1.1 SAFETY REQUIREMENTS

- A. Refer to section 01 35 26, SAFETY REQUIREMENTS for safety and infection control requirements.

1.2 GENERAL INTENTION

- A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for _568A4-21-702 EHRM Infrastructure Upgrades - Hot Springs, SD as required by drawings and specifications.
- B. Visits to the site by Bidders shall be made in accordance with the solicitation.
- C. Offices of GDM of Oregon 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 Contracting Officer or his duly authorized representative.
- D. Work subject to tests and/or testing laboratory shall be retained by General Contractor. Also see 014529 Quality Control, and 019100 General Commissioning Requirements.
- E. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

The General Requirements does not include the core working hours that the contractor should follow. If we are not adding the core

Working Hours:

- a. Normal working hours for this contract will be from 8:00AM to 4:30PM (local time) Monday through Friday except for weekends and established Federal Holidays.
- b. Performing on-site work outside normal working hours will require approval from the Contracting Officer and the COR. Requests shall be submitted via email at least 72 hours prior to the requested date and at no additional cost to the Government. Approvals are subject to the availability of on-site staff.

F. The Key Personnel assigned by the contractor for the performance of work on this contract shall be acceptable to VA in terms of personal and professional conduct and technical knowledge. Should the assignment to this contract of any person by the contractor be deemed to conflict with the interests of VA, or in the event performance is deemed to be unsatisfactory at any time during the life of the contract, the Contracting Officer may notify the contractor and request the person be removed from the assignment. The reason for removal will be documented and a request to receive key personnel replacement within three (3) business days of the notification will be made. Replacement of key personnel qualifications shall be equal to or greater than those of the key personnel being replaced. Employment and staffing difficulties will not be justification for failure to meet established schedules. The contractor is required to submit a resume with qualifications for the proposed replacement which shall be approved by the COR and CO prior to the replacement starting work.

1.3 STATEMENT OF BID ITEM(S)

A. ITEM I, General Construction:

1. Work includes general construction, alterations, necessary removal and/or modifications of existing structures and construction, patching and finishing work, and certain other items.

B. ITEM II, Mechanical Work:

1. Work includes all labor, material, equipment and supervision to perform the required Mechanical construction work on this project including:
 - a. Installation of new split system air conditioning units.
 - b. Modifications to existing DDC controls.
 - c. Setup, programming, and adjustment of new & modified systems.

C. ITEM III, Electrical System Work:

1. Work includes all labor, material, equipment and supervision to perform the required electrical and telecommunications systems construction work on this project including:
 - a. Provide new power connections for new mechanical equipment.
 - b. Provide new power connections for MDF/IDF rack locations.
 - c. Provide new UPS units for MDF/IDF locations.
 - d. Provide registered RCDD supervision during construction.

1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

- A. Drawings and contract documents may be obtained from the website where the solicitation is posted. Additional copies will be at Contractor's expense.

1.5 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. The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.

B. Security Procedures:

1. General Contractor's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
2. Before starting work the General Contractor shall give one week's notice to the Contracting Officer so that security escort and 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 Contracting Officer. Patients and staff are not to be photographed at any time.
4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Key Control:

1. Only a limited number of keys will be issued to the contractor. Key requests shall be made in writing to the COR.
2. If the Contractor loses a key, a charge of \$30 will be billed for a replacement key.
3. Ensure all doors leading to and from construction are either monitored or locked to prevent access to the area from unauthorized persons.

D. Document Control:

1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This

- information shall be shared only with those with a specific need to accomplish the project.
3. 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 Contracting Officer upon request.
 4. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.
 5. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
 6. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".
 7. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).
 - a) Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.
 - b) "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.
- E. Motor Vehicle Restrictions
1. Contractor may have designated areas pending campus activities, to be coordinated by the COR or COR representative.

1.6 OPERATIONS AND STORAGE AREAS (FAR 52.236-10)

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. 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 sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer 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. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
- C. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. 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 to curbs, sidewalks, and roads.
- D. ***** Lay down area, conditioned storage area for fiber/etc, working space and space available on campus for storing materials shall be the procured by the contractor unless identified on the drawings. *****

- E. Workers are subject to rules of Medical Center applicable to their conduct.
- F. N/A
- G. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by COR where required by limited working space.
 - 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 Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Medical Center areas required to remain in operation.
 - 3. Where access by Medical Center 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.
- H. Utilities Services: Where necessary to cut existing pipes, electrical wires, conduits, cables, etc., of utility services, or of fire protection systems or communications systems (except telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR . All such actions shall be coordinated with the COR or Utility Company involved:
 - 1. 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.

I. Phasing:

1. The Medical Center must maintain its operation 24 hours a day 7 days a week. Therefore, any interruption in service must be scheduled and coordinated with the COR to ensure that no lapses in operation occur. It is the CONTRACTOR'S responsibility to develop a work plan and schedule detailing, at a minimum, the procedures to be employed, the equipment and materials to be used, the interim life safety measure to be used during the work, and a schedule defining the duration of the work with milestone subtasks.
2. To ensure such executions, Contractor shall furnish the COR with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the COR two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to ensure accomplishment of this work in successive phases mutually agreeable to COR.
3. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. These routes whether access or egress shall be isolated from the construction area by temporary partitions and have walking surfaces, lighting etc. to facilitate patient and staff access. Coordinate alteration work in areas occupied by

Department of Veterans Affairs so that Medical Center operations will continue during the construction period.

4. N/A.

- J. Construction Fence: Before construction operations begin, 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 COR.
- K. When a building and/or construction site is turned over to Contractor, Contractor shall accept entire responsibility including upkeep and maintenance therefore:
1. Contractor shall maintain a minimum temperature of 4 degrees C (40 degrees F) at all times, except as otherwise specified.
 2. Contractor shall maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment, Contractor shall make arrangements for pre-inspection of site with Fire Department or Company (Department of Veterans Affairs or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.
- L. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, 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 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 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 a detailed work plan. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, 27 05 11 REQUIREMENTS FOR COMMUNICATIONS .
2. Contractor shall submit a request to interrupt any such services to COR, in writing, 7 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
3. 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 Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COR.
5. In case of a contract construction emergency, service will be interrupted on approval of 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.

- M. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, shall be removed back to their source. Those which are indicated to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged at the main, branch or panel they originate from. The lines shall not be capped in finished areas, but shall be removed and sealed, 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.
- N. To minimize interference of construction activities with flow of Medical Center 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 with approval.
 2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the COR.
- O. Coordinate the work for this contract with other construction operations as directed by COR. This includes the scheduling of traffic and the use of roadways.

P. N/A

1.7 ALTERATIONS

- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the COR and a representative of VA Supply Service, buildings and campus in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by COR and contractor. This report shall list by rooms and spaces:

1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout affected areas of buildings.
 2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.
 3. Shall note any discrepancies between drawings and existing conditions at site.
 4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and COR.
- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COR, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4).
- C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and COR together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage

caused by Contractor's workers in executing work of this contract.

D. Protection: Provide the following protective measures:

1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.
2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.
3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

1.8 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 and/or noted on drawings or in specifications. 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 COR.
2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.
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. Room owner will not be occupying the space during construction, however the room office equipment will remain. ****** It shall be the**

construction contractor responsibility to "gently move" office equipment locally (desks, chairs, cabinets, etc) to complete the construction work, clean, and return office equipment to their original locations. Contractor shall understand the VA does not have labor to assist with this effort.****

4. If applicable 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 Contracting Officer who will annotate the contract file and transmit the Manifest to the Medical Center's Cemetery's Chief.

- 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 CFR 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

**1.9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT,
UTILITIES, AND IMPROVEMENTS (FAR 52.236-9)**

- A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall 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 workers, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the COR.
- B. The Contractor shall 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. The Contractor shall 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 Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

- 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 medical center) 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 provide 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.

1.10 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 COR. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the 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 Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workers to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) 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 "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

1.11 PHYSICAL DATA - SOIL CONDITIONS

- A. Data and information furnished or referred to below 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.

1. The indications of physical conditions on the drawings and in the specifications are the result of site investigations by _____ See SOW drawings and specifications_____.

(FAR 52.236-4)

- 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 Engineering Officer at the VA Medical Center, ____ See SOW drawings and specifications _____ and shall be considered part of the contract documents.
- D. 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 site of work and logs of borings; and, after investigation, decide for themselves character of materials and make their bids accordingly. Upon proper application to Department of Veterans Affairs, bidders will be permitted to make subsurface explorations of their own at site.

1.12 (IF APPLICABLE) 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. The Contractor shall certify 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.

1.13 (IF APPLICABLE) LAYOUT OF WORK

- A. The Contractor shall 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. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

(FAR 52.236-17)

- B. Establish and plainly mark center lines for each building and corner of column lines and/or addition to each existing building, lines for each gravesite control monument, and 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, roads, parking lots, gravesite control monuments, are in accordance with lines 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. Survey shall include, but not be limited to, location of lines and grades of footings,

exterior walls, center lines of columns in both 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 COR before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) is placed.
- D. During progress of work, and particularly as work progresses from floor to floor, 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 COR before any major items of concrete work are placed. In addition, Contractor shall also furnish to the 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.
- E. Whenever changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to COR.
- F. Upon completion of the work, the Contractor shall furnish the COR one electronic copy and reproducible drawings 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.

- G. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

1.14 AS-BUILT DRAWINGS

- A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to 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 ensure compliance, AutoCAD (DWG) as-builts, complete with all relevant shape files, XREFS, fonts, tables, and other background implementations/links necessary to recreate the Acrobat PDF files provided in full, shall be made available for the COR review, as often as requested. Scanned PDFs of as-builts are not acceptable. They must be AutoCAD exported PDFs, complete with the appropriate layers. Only red-line versions of field drawings may be scanned as PDFs.as-built drawings.
- C. Contractor shall deliver two approved completed sets of as-built drawings in the electronic version (scanned PDF) to the COR within 15 calendar days after each completed phase and after the acceptance of the project by the COR.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.15 WARRANTY MANAGEMENT

- A. Warranty Management Plan: Develop a warranty management plan which contains information relevant to FAR 52.246-21 Warranty of Construction in at least 30 days before the planned pre-warranty conference, submit two sets of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all

warranties to which it is entitled. The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesman, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has been submitted or was approved.

Warranty information made available during the construction phase must be submitted to the Contracting Officer for approval prior to each monthly invoice for payment. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period will begin on the date of the project acceptance and continue for the product warranty period. A joint 4 month and 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contactor and the Contracting Officer. Include in the warranty management plan, but not limited to, the following:

1. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the company of the Contractor, subcontractors, manufacturers or suppliers involved.
2. Furnish with each warranty the name, address and telephone number of each of the guarantor's representatives nearest project location.
3. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers and for all commissioned systems such as fire protection and alarm systems, sprinkler systems and lightning protection systems, etc.
4. A list for each warranted equipment item, feature of construction or system indicating:
 - a. Name of item.
 - b. Model and serial numbers.
 - c. Location where installed.

- d. Name and phone numbers of manufacturers and suppliers.
 - e. Name and phone numbers of manufacturers or suppliers.
 - f. Names, addresses and phone numbers of sources of spare parts.
 - g. Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.
 - h. Starting point and duration of warranty period.
 - i. Summary of maintenance procedures required to continue the warranty in force.
 - j. Cross-reference to specific pertinent Operation and Maintenance manuals.
 - k. Organizations, names and phone numbers of persons to call for warranty service.
 - l. Typical response time and repair time expected for various warranted equipment.
5. The plans for attendance at the 4 and 9-month post construction warranty inspections conducted by the government.
 6. Procedure and status of tagging of all equipment covered by extended warranties.
 7. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- B. Performance & Payment Bonds: The Performance & Payment Bonds must remain effective throughout the construction period.
1. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the

- Government while performing the work, including, but not limited to administrative expenses.
2. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the contractor's expenses, the Contracting Officer will have the right to recoup expenses from the bonding company.
 3. Following oral or written notification of required construction warranty repair work, the Contractor shall respond in a timely manner. Written verification will follow oral instructions. Failure to respond will be cause for the Contracting Officer to proceed against the Contractor.
- C. Pre-Warranty Conference: Prior to contract completion, and at a time designated by the Contracting Officer, the Contractor shall meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contract will be located within the local service area of the warranted construction, be continuously available and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in conjunction with other portions of this provision.
- D. Contractor's Response to Construction Warranty Service Requirements:

E. Following written notification by the Contracting Officer, the Contractor shall respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. Include within the report the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and back charge the construction warranty payment item established.

1. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.
2. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.
3. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.
4. The "Construction Warranty Service Priority List" is as follows:

a) Code 1-Life Safety Systems

- 1) Fire suppression systems.
- 2) Fire alarm system(s).

b) Code 1-Air Conditioning Systems

- 1) Air conditioning leak in part of the building, if causing damage.
- 2) Air conditioning system not cooling properly.

c) Code 1 Doors

- 1) Overhead doors not operational, causing a security, fire or safety problem.
- 1) Interior, exterior personnel doors or hardware, not functioning properly, causing security, fire or safety problem.
- d) Code 3-Doors
 - 1) Overhead doors not operational.
 - 2) Interior/exterior personnel doors or hardware not functioning properly.
- e) Code 1-Electrical
 - 1) Power failure (entire area or any building operational after 1600 hours).
 - 2) Security lights.
 - 3) Smoke detectors.
- f) Code 2-Electrical
 - 1) Power failure (no power to a room or part of building).
Receptacle and lights not operational (in a room or part of building).
- g) Code 3-Electrical
 - 1) Exterior lights not operational.
- h) Code 1-Gas
 - 1) Leaks and pipeline breaks.
- i) Code 1-Heat
 - 1) Power failure affecting heat.
- j) Code 1-Plumbing
 - 1) Hot water heater failure.
 - 2) Leaking water supply pipes
- k) Code 2-Plumbing
 - 1) Flush valves not operating properly
 - 2) Fixture drain, supply line or any water pipe leaking.
 - 3) Toilet leaking at base.
- 1) Code 3- Plumbing
 - 1) Leaky faucets.

- m) Code 3-Interior
 - 1) Floors damaged.
 - 2) Paint chipping or peeling.
 - 3) Casework damaged.
 - n) Code 1-Roof Leaks
 - 1) Damage to property is occurring.
 - o) Code 2-Water (Exterior)
 - 1) No water to facility.
 - p) Code 2-Water (Hot)
 - 1) No hot water in portion of building listed.
 - q) Code 3
 - 1) All work not listed above.
- F. Warranty Tags: At the time of installation, tag each warranted item with a durable, oil and water-resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also submit two record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

Warranty Tags
Type of product/material
Model number
Serial number
Contract number
Warranty period from/to
Inspector's signature
Construction Contractor
Address
Telephone number
Warranty Contact
Address

Warranty Tags
Telephone number
Warranty response time priority code

1.16 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the COR, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed and restoration performed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.
- B. When new permanent roads are to be a part of this contract, Contractor may construct them immediately for use 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 time set for completion of such buildings or parts thereof.

1.17 RESIDENT ENGINEER'S FIELD OFFICE: N/A

1.18 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 written approval and compliance with the following provisions:
 - 1. Permission to use each unit or system must be given by COR in writing. If the equipment is not installed and maintained in accordance with the written agreement and following

- provisions, the 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, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Installation of temporary electrical equipment or devices shall be in accordance with NFPA 70, National Electrical Code, (2014 Edition), Article 590, *Temporary Installations*. 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.
- D. Any damage to the equipment or excessive wear due to prolonged use will be repaired replaced by the contractor at the contractor's expense.

1.19 TEMPORARY USE OF EXISTING ELEVATORS

- A. Contractor use of existing elevators shall be approved by COR on a case by case basis. Where available ground docks, entrances, and ramps shall be utilized.

1.20 TEMPORARY USE OF NEW ELEVATORS: N/A

1.21 TEMPORARY TOILETS

- A. Provide where directed, (for use of all Contractor's workers) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by 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. Contractor may have for use of Contractor's workers, such toilet accommodations as may be assigned to Contractor by COR. Contractor shall keep such places clean and be responsible for any damage done thereto by Contractor's workers. Failure to maintain satisfactory condition in toilets will deprive Contractor of the privilege to use such toilets.

1.22 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.

- B. 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:
- C. Electricity (for Construction and Testing): Furnish all temporary electric services.
 - 1. Obtain electricity by connecting to the Medical Center electrical distribution system.
- D. Water (for Construction and Testing): Furnish temporary water service.
 - 1. Obtain water by connecting to the Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection as per code. Water is available at no cost to the Contractor.
 - 2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation (at COR discretion) of use of water from Medical Center's system.

1.23 NEW TELEPHONE EQUIPMENT

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

1.24 TESTS

- A. As per specification section 23 05 93 the contractor shall provide a written testing and commissioning plan complete with component level, equipment level, sub-system level and system level breakdowns. The plan will provide a schedule and a written sequence of what will be tested, how and what the expected outcome will be. This document will be submitted for approval prior to commencing work. The contractor shall document the

results of the approved plan and submit for approval with the as built documentation.

- B. 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.
- C. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.
- D. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire system 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, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a system which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feedwater, condensate and other related components.
- E. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably period of time during which operating and environmental conditions remain reasonably constant and are typical of the design conditions.
- F. 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.

1.25 INSTRUCTIONS

- A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. Manuals: Maintenance and operating manuals and one compact disc (four hard copies and one electronic copy each) for each separate piece of equipment shall be delivered to the COR coincidental with the delivery of the equipment to the job site. Manuals shall be complete, 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 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. 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: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed training 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.

Instructions for different items of equipment that are component

parts of a complete system, shall be given in an integrated, progressive manner. 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 COR and shall be considered concluded only when the COR is satisfied in regard to complete and thorough coverage. The contractor shall submit a course outline with associated material to the COR for review and approval prior to scheduling training to ensure the subject matter covers the expectations of the VA and the contractual requirements. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.26 GOVERNMENT-FURNISHED PROPERTY N/A

1.27 RELOCATED EQUIPMENT ITEMS N/A

1.28 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT N/A

1.29 CONSTRUCTION SIGN: SEE SOW AND DRAWINGS

1.30 SAFETY SIGN : SEE SOW AND DRAWINGS

1.31 PHOTOGRAPHIC DOCUMENTATION

A. During the construction period through completion, provide photographic documentation of construction progress and at selected milestones including electronic indexing, navigation, storage and remote access to the documentation, as per these specifications.

1. Construction progress for all trades shall be tracked at pre-determined intervals, but not less than once every thirty (30) calendar days ("Progressions"). Progression documentation

- shall track both the exterior and interior construction of the building. Exterior Progressions shall track 360 degrees around the site and each building. Interior Progressions shall track interior improvements beginning when stud work commences and continuing until Project completion.
2. As-built conditions of mechanical, electrical, plumbing and all other systems shall be documented post-inspection and pre-insulation, sheet rock or dry wall installation. This process shall include all finished systems located in the walls and ceilings of all buildings at the Project. Overlapping photographic techniques shall be used to ensure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.
 3. As-built conditions of exterior skin and elevations shall be documented with an increased concentration of digital photographs as directed by the COR in order to capture pre-determined focal points, such as waterproofing, window flashing, radiused steel work, architectural or Exterior Insulation and Finish Systems (EIFS) detailing. Overlapping photographic techniques shall be used to ensure maximum coverage. Indexing and navigation accomplished through interactive elevations or elevation details.
 4. As-built finished conditions of the interior of each building including floors, ceilings and walls shall be documented at certificate of occupancy or equivalent, or just prior to occupancy, or both, as directed by the COR. Overlapping photographic techniques shall be used to ensure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.

1.32 FINAL ELEVATION DIGITAL IMAGES N/A

1.33 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 COR verbally, and
then with a written follow up.

1.34 VA TRIRIGA CPMS N/A

- - - E N D - - -

SECTION 01 32 16.15
PROJECT SCHEDULES

PART 1- GENERAL

1.1 DESCRIPTION:

- A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule 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) technique shall be utilized to satisfy both time and cost applications.

1.2 CONTRACTOR'S REPRESENTATIVE:

- A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the COR.
- 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.
- C. The Contractor's representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant.

1.3 COMPUTER PRODUCED SCHEDULES

- A. The contractor shall provide monthly, to the Department of Veterans Affairs Program Contracting Activity Central(PCAC) 6150 Oak Tree Blvd, Suite 300 Independence, OH 44131, Attn: Contracting Officer 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 the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COR shall identify the five different report formats that the contractor shall provide.
- B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor

shall 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 will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated CD-ROM's, when requested by the COR, to correct errors which affect the payment and schedule for the project.

1.4 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

- A. Within 10 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three black line copies of the interim schedule on sheets of paper (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. 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, activity/event description, duration, 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 or 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 Project Schedule 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 zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. The final Project Schedule 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 Project Schedule 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 interim Project Schedule and the complete final Project Schedule, 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 black line copies of the revised Project Schedule, 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 schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.

1.5 WORK ACTIVITY/EVENT COST DATA

- A. The Contractor shall cost load all work activities/events except procurement activities. 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. 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 Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).
- C. In accordance with FAR 52.236 - 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 - 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), 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 all BID ITEMS including ASBESTOS AND LEAD PAINT ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid for the bid items accepted and awarded to the Contractor by the VA.

1.6 PROJECT SCHEDULE REQUIREMENTS

- A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:

1. 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 Representative's (COR) and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
- c. Interruption of VA Facilities 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. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.

2. 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.
3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, 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 COR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop

drawing, or other submittals will not be less than 20 work days.

4. 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.
 5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.
 2. The planned number of shifts per day.
 3. The number of hours to be worked per shift.
- C. Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- D. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COR. 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 COR's approval of the Project Schedule.
- E. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

1.7 PAYMENT TO THE CONTRACTOR:

- A. Monthly, the contractor shall submit an application and certificate for payment using VA Form 10-6001a or 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 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently

approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.

- B. Approval of the Contractor's monthly Application for Payment shall be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

1.8 PAYMENT AND PROGRESS REPORTING

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the COR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COTR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
1. Actual start and/or finish dates for updated/completed activities/events.
 2. Remaining duration for 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 Project Schedule.
 4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
 5. Completion percentage for all completed and partially completed activities/events.
 6. Logic and duration revisions required by this section of the specifications.
 7. Activity/event duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall 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.
- C. After completing the monthly schedule update, the contractor's representative or 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 COR for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the COR. 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 COR within 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.

- D. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, COR, 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.

1.9 RESPONSIBILITY FOR COMPLETION

- A. If it becomes apparent from the current revised monthly progress 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 COR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.
- C. All contract work, in each phase, including final inspection and punch list items impacting unobstructed use of the area(s), of that phase, shall be completed by the Contractor prior to turning over the area(s) to the VA for their 21 calendar day equipment relocation and occupancy. It will be at the discretion of the VA as to which punch list items prevent unobstructed use of the area(s) of phases. All phase work must be completed, including all punch list items, within the overall project period timeframe.

1.10 CHANGES TO THE SCHEDULE

- A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (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, 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 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, shall be furnished in writing to the Contracting Officer for approval.

- C. Contracting Officer's approval for the revised project schedule 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 COR.
- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 - 4 (Changes), 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 Project Schedule not resulting from contract changes is the responsibility of the Contractor.

1.11 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 COR 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 FAR 52.243 - 4 (Changes). 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.

1.12 PERIOD OF PERFORMANCE

- A. Reference FAR 52.211-10 Commencement, Prosecution and Completion of the Work.
- B. The Contractor shall be required to:
1. Commence work under this Contract within 14 calendar days after the date the Contractor receives the notice to proceed (NTP);
 2. Prosecute the work diligently; and
 3. Complete the entire work ready for use not later than 270 calendar days after receipt of notice to proceed for Phase 1. The time stated for completion shall include final cleanup of the premises.
- C. The total period of performance is defined below:
1. Phase 1 - Submittals - 60 calendar days after Phase 1 Notice to Proceed. Please note that Safety and Schedule submittals shall be submitted in a timely enough manner, sufficient to allow for review and approval by the government of at least 21 calendar days at each iteration. The time for the Safety and Schedule submittals is concurrent with the time for Material submittals.
 2. Phase 2 - Physical Construction - The Notice to Proceed for physical construction will be issued upon receipt and approval of the safety and schedule submittals and receipt of 100% of all material submittals and approval of at least 50% of the material submittals. The period of performance of Phase 2 will be the number of calendar days remaining between the date of the Phase 2 Notice to Proceed and the Contract end date established by the Phase 1 Notice to Proceed. Determination of whether or not 50% of the Material submittals are approved is the sole right of the government.
 3. Overall Project Period: 270 calendar days after Notice to Proceed.

- - - E N D - - -

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

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This specification defines the general requirements and procedures for submittals. A submittal is information submitted for VA review to establish compliance with the contract documents.
- B. Detailed submittal requirements are found in the technical sections of the contract specifications. The COR may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective technical specifications at no additional cost to the government.
- C. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.

1.2 DEFINITIONS

- A. Preconstruction Submittals: Submittals which are required prior to issuing contract notice to proceed or starting construction. For example, Certificates of insurance; Surety bonds; Site-specific safety plan; Construction progress schedule; Schedule of values; Submittal register; List of proposed subcontractors.
- B. Shop Drawings: Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work. Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be integrated and coordinated.
- C. Product Data: Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions, and brochures, which describe and illustrate size, physical appearance, and other characteristics of materials, systems, or equipment for some portion of the work. Samples of warranty language when the contract requires extended product warranties.
- D. Samples: Physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged. Color samples from the manufacturer's standard line (or custom color samples if

specified) to be used in selecting or approving colors for the project. Field samples and mock-ups constructed to establish standards by which the ensuing work can be judged.

- E. Design Data: Calculations, mix designs, analyses, or other data pertaining to a part of work.
- F. Test Reports: Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work. Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.
- G. Certificates: Document required of Contractor, or of a manufacturer, supplier, installer, or subcontractor through Contractor. The purpose is to document procedures, acceptability of methods, or personnel qualifications for a portion of the work.
- H. Manufacturer's Instructions: Pre-printed material describing installation of a product, system, or material, including special notices and MSDS concerning impedances, hazards, and safety precautions.
- I. Manufacturer's Field Reports: Documentation of the testing and verification actions taken by manufacturer's representative at the job site on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must indicate whether the material, product, or system has passed or failed the test.
- J. Operation and Maintenance Data: Manufacturer data that is required to operate, maintain, troubleshoot, and repair equipment, including manufacturer's help, parts list, and product line documentation. This data shall be incorporated in an operations and maintenance manual.
- K. Closeout Submittals: Documentation necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a phase of construction on a multi-phase contract.

1.3 SUBMITTAL REGISTER

- A. The Contractor-prepared submittal register will list items of equipment and materials for which submittals are required by the specifications. This list may not be all inclusive and additional submittals may be required by the specifications. The Contractor is not relieved from supplying submittals required by the contract documents but which have been omitted from the submittal register.

- B. The submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period.
- C. The VA will provide the Contractor with the A/E-developed initial submittal register in electronic form. Thereafter, the Contractor shall track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the VA.
- D. The Contractor shall update the submittal register as submittal actions occur and maintain the submittal register at the project site until final acceptance of all work by COR.
- E. The Contractor shall submit formal monthly updates to the submittal register in electronic format. Each monthly update shall document actual submission and approval dates for each submittal.

1.4 SUBMITTAL SCHEDULING

- A. Submittals are to be scheduled, submitted, reviewed, and approved prior to the acquisition of the material or equipment.
- B. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow time for potential resubmittal.
- C. No delay costs or time extensions will be allowed for time lost in late submittals or resubmittals.
- D. All submittals are required to be approved prior to the start of the specified work activity.
- E. It is strongly suggested that the contractor submit long lead items for approval early in the project to avoid project delays due to untimely submission of submittals.
- F. An updated progress schedule is to be provided prior to the submittal of each request for payment. The updated schedule is to show all activities started and/or completed during the reporting period and a projection of the activities that will take place during the following reporting period.
- G. Allow a minimum of 21 calendar days for submittal review from the time the submittals are received by the A/E until they are returned by the COR to the Contractor.
 - 1. Submittals on finishes related to textures, patterns, and colors of materials shall be submitted as one complete package so that all finish materials and colors may be coordinated and selected at one time.

1.5 SUBMITTAL PREPARATION

- A. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.
- B. Collect required data for each specific material, product, unit of work, or system into a single submittal. Prominently mark choices, options, and portions applicable to the submittal. Partial submittals will not be accepted for expedition of construction effort. Submittal will be returned without review if incomplete.
- C. If available product data is incomplete, provide Contractor-prepared documentation to supplement product data and satisfy submittal requirements.
- D. All irrelevant or unnecessary data shall be removed from the submittal to facilitate accuracy and timely processing. Submittals that contain the excessive amount of irrelevant or unnecessary data will be returned with review.
- E. Provide a transmittal form for each submittal with the following information:
 - 1. Project title, location and number.
 - 2. Construction contract number.
 - 3. Date of the drawings and revisions.
 - 4. Name, address, and telephone number of subcontractor, supplier, manufacturer, and any other subcontractor associated with the submittal.
 - 5. List paragraph number of the specification section and sheet number of the contract drawings by which the submittal is required.
 - 6. When a resubmission, add alphabetic suffix on submittal description. For example, submittal 18 would become 18A, to indicate resubmission.
 - 7. Product identification and location in project.
- F. The Contractor is responsible for reviewing and certifying that all submittals are in compliance with contract requirements before submitting for VA review. Proposed deviations from the contract requirements are to be clearly identified. All deviations submitted must include a side by side comparison of item being proposed against item specified. Failure to point out deviations will result in the VA requiring removal and replacement of such work at the Contractor's expense.

- G. Stamp, sign, and date each submittal transmittal form indicating action taken.
- H. Stamp used by the Contractor on the submittal transmittal form to certify that the submittal meets contract requirements is to be similar to the following:

CONTRACTOR
(Firm Name)
_____ Approved
_____ Approved with corrections as noted on submittal data and/or attached sheets(s)
SIGNATURE: _____
TITLE: _____
DATE: _____

1. The submittal stamp may be electronically completed and signed.

1.6 SUBMITTAL FORMAT AND TRANSMISSION

- A. Provide submittals in electronic format, with the exception of material samples. Use PDF as the electronic format, unless otherwise specified or directed by the COR.
 1. All documents (submittals) should be sent through FTP File Sharing system.
- B. Compile the electronic submittal file as a single, complete document. Name the electronic submittal file specifically according to its contents.
- C. Electronic files must be of sufficient quality that all information is legible. Generate PDF files from original documents so that the text included in the PDF file is both

searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required.

- D. Transmit all electronic documents through the Project Management Software platform. Refer to Section 01 00 00, GENERAL REQUIREMENTS, Paragraph 1.30, "Project Management Software".
- E. All documents (submittals) should be sent through FTP File Sharing system.
- F. Provide one hard copy of all approved submittals.
- G. Any deviations from the contract requirements and justification therefore shall be so stated in the letter of transmittal.
- H. No fabrication of work shall be done or any part of parts thereof shipped to the site prior to approval of required shop drawings for such work.
- I. VA approval of samples, certificates, manufacturers' literature and data, and shop drawings will be subject to contract requirements and shall not relieve the contractor from responsibility for errors of any sort in such submittals or from any unauthorized deviations from contract requirements. An authorized deviation is a deviation that has been identified by the contractor, or Government, and confirmed by an appropriate contract modification.

1.7 SAMPLES

- A. Submit two sets of physical samples showing range of variation, for each required item.
- B. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified.
- C. When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.
- D. Before submitting samples, the Contractor is to ensure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.
- E. The VA reserves the right to disapprove any material or equipment which previously has proven unsatisfactory in service.
- F. Physical samples supplied maybe requested back for use in the project after reviewed and approved.

1.8 OPERATION AND MAINTENANCE DATA

- A. Submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.
- B. In the event the Contractor fails to deliver O&M Data within the time limits specified, the COR may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.9 TEST REPORTS

- A. COR may require specific test after work has been installed or completed which could require contractor to repair test area at no additional cost to contract.

1.10 VA REVIEW OF SUBMITTALS AND RFIs (REQUEST FOR INFORMATION)

- A. The VA will review all submittals for compliance with the technical requirements of the contract documents. The Architect-Engineer for this project will assist the VA in reviewing all submittals and determining contractual compliance. Review will be only for conformance with the applicable codes, standards and contract requirements.
- B. Period of review for submittals begins when the VA COR receives submittal from the Contractor.
- C. Period of review for each resubmittal is the same as for initial submittal.
- D. VA review period is 21 calendar days for submittals.
- E. VA review period is 14 calendar days for RFIs.
- F. The VA will return submittals to the Contractor with the following notations:
 - 1. "Approved": authorizes the Contractor to proceed with the work covered.
 - 2. "Approved as noted": authorizes the Contractor to proceed with the work covered provided the Contractor incorporates the noted comments and makes the noted corrections.
 - 3. "Disapproved, revise and resubmit": indicates noncompliance with the contract requirements or that submittal is incomplete. Resubmit with appropriate changes and corrections. No work shall proceed for this item until resubmittal is approved.
 - 4. "Not reviewed": indicates submittal does not have evidence of being reviewed and approved by Contractor or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not

reviewed. Resubmit submittals after taking appropriate action.

1.11 APPROVED SUBMITTALS

- A. The VA approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.
- B. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.
- C. After submittals have been approved, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.
- D. Retain a copy of all approved submittals at project site, including approved samples.

1.12 WITHHOLDING OF PAYMENT

- A. Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

1.13 EXCESSIVE RESUBMITTAL PENALTY

- A. The General Contractor is responsible for reviewing all submittals and coordinating them with other trades prior to submitting them for VA review. All shop drawings, product data, installation instructions, etc. shall be job specific and meet the requirements called forth in the Construction Documents. Should any given submittal require more than two resubmittals, the Contractor will be back-charged by the VA via a contracting change order on a time and materials basis for each additional review. A/E Consult Team standard billing rates will apply.

- - - E N D - - -

SECTION 01 35 26
SAFETY REQUIREMENTS

1.1 APPLICABLE PUBLICATIONS:

A. Latest publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.

B. American Society of Safety Engineers (ASSE):

A10.1-2011Pre-Project & Pre-Task Safety and Health
Planning

A10.34-2012Protection of the Public on or Adjacent to
Construction Sites

A10.38-2013Basic Elements of an Employer's Program to
Provide a Safe and Healthful Work Environment
American National Standard Construction and
Demolition Operations

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

E84-2013Surface Burning Characteristics of Building
Materials

D. The Facilities Guidelines Institute (FGI):

FGI Guidelines-2010Guidelines for Design and Construction of
Healthcare Facilities

E. National Fire Protection Association (NFPA):

10-2018Standard for Portable Fire Extinguishers

30-2018Flammable and Combustible Liquids Code

51B-2019Standard for Fire Prevention During Welding,
Cutting and Other Hot Work

70-2020National Electrical Code

70B-2019Recommended Practice for Electrical Equipment
Maintenance

70E-2018Standard for Electrical Safety in the Workplace

99-2018Health Care Facilities Code

241-2019Standard for Safeguarding Construction,
Alteration, and Demolition Operations

F. The Joint Commission (TJC)

TJC ManualComprehensive Accreditation and Certification
Manual

G. U.S. Nuclear Regulatory Commission

10 CFR 20Standards for Protection Against Radiation

H. U.S. Occupational Safety and Health Administration (OSHA):

29 CFR 1910Safety and Health Regulations for General
Industry

29 CFR 1926Safety and Health Regulations for Construction
Industry

I. VHA Directive 2005-007

1.2 DEFINITIONS:

A. Critical Lift. A lift with the hoisted load exceeding 75% of the crane's maximum capacity; lifts made out of the view of the operator (blind picks); lifts involving two or more cranes; personnel being hoisted; and special hazards such as lifts over occupied facilities, loads lifted close to power-lines, and lifts in high winds or where other adverse environmental conditions exist; and any lift which the crane operator believes is critical.

B. OSHA "Competent Person" (CP). One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).

C. "Qualified Person" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

D. High Visibility Accident. Any mishap which may generate publicity or high visibility.

E. Accident/Incident Criticality Categories:

1. No impact - near miss incidents that should be investigated but are not required to be reported to the VA;
2. Minor incident/impact - incidents that require first aid or result in minor equipment damage (less than \$5000). These incidents must be investigated but are not required to be reported to the VA;
3. Moderate incident/impact - Any work-related injury or illness that results in:
 - a. Days away from work (any time lost after day of injury/illness onset);
 - b. Restricted work;
 - c. Transfer to another job;
 - d. Medical treatment beyond first aid;
 - e. Loss of consciousness;
4. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (5) above or,
5. Any incident that leads to major equipment damage (greater than \$5000).

F. These incidents must be investigated and are required to be reported to the VA;

- 1 Major incident/impact - Any mishap that leads to fatalities, hospitalizations, amputations, and losses of an eye as a result of contractors' activities. Or any incident which leads to major property damage (greater than \$20,000) and/or may generate publicity or high visibility. These incidents must be investigated and are required to be reported to the VA as soon as practical, but not later than 2 hours after the incident.

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

1.3 REGULATORY REQUIREMENTS:

- A. In addition to the detailed requirements included in the provisions of this contract, comply with 29 CFR 1926, comply with 29 CFR 1910 as incorporated by reference within 29 CFR 1926, comply with ASSE A10.34, and all applicable [federal, state, and local] laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern except with specific approval and acceptance by the Government Designated Authority.

1.4 ACCIDENT PREVENTION PLAN (APP):

- A. The APP (aka Construction Safety & Health Plan) shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and ensure it is site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all worksite safety and health of each subcontractor(s). Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working

conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out.

B. The APP shall be prepared as follows:

1. Written in English by a qualified person who is employed by the Prime Contractor articulating the specific work and hazards pertaining to the contract (model language can be found in ASSE A10.33). Specifically articulating the safety requirements found within these VA contract safety specifications.
2. Address both the Prime Contractors and the subcontractors work operations.
3. State measures to be taken to control hazards associated with materials, services, or equipment provided by suppliers.
4. Address all the elements/sub-elements and in order as follows:
 - a. **SIGNATURE SHEET.** Title, signature, and phone number of the following:
 - 1) Plan preparer (Qualified Person such as corporate safety staff person or contracted Certified Safety Professional with construction safety experience);
 - 2) Plan approver (company/corporate officers authorized to obligate the company);
 - 3) Plan concurrence (e.g., Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional). Provide concurrence of other applicable corporate and project personnel (Contractor).
 - b. **BACKGROUND INFORMATION.** List the following:
 - 1) Contractor;
 - 2) Contract number;
 - 3) Project name;

- 4) Brief project description, description of work to be performed, and location; phases of work anticipated (these will require an AHA).
- c. **STATEMENT OF SAFETY AND HEALTH POLICY.** Provide a copy of current corporate/company Safety and Health Policy Statement, detailing commitment to providing a safe and healthful workplace for all employees. The Contractor's written safety program goals, objectives, and accident experience goals for this contract should be provided.
- d. **RESPONSIBILITIES AND LINES OF AUTHORITIES.** Provide the following:
- 1) A statement of the employer's ultimate responsibility for the implementation of his SOH program;
 - 2) Identification and accountability of personnel responsible for safety at both corporate and project level. Contracts specifically requiring safety or industrial hygiene personnel shall include a copy of their resumes.
 - 3) The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA Competent/Qualified Person(s) requirements must be attached.;
 - 4) Requirements that no work shall be performed unless a designated competent person is present on the job site;
 - 5) Requirements for pre-task Activity Hazard Analysis (AHAs);
 - 6) Lines of authority;
 - 7) Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified;
- e. **SUBCONTRACTORS AND SUPPLIERS.** If applicable, provide procedures for coordinating SOH activities with other employers on the job site:
- 1) Identification of subcontractors and suppliers (if known);

- 2) Safety responsibilities of subcontractors and suppliers.

f. TRAINING.

- 1) Site-specific SOH orientation training at the time of initial hire or assignment to the project for every employee before working on the project site is required.
- 2) Mandatory training and certifications that are applicable to this project (e.g., explosive actuated tools, crane operator, rigger, crane signal person, fall protection, electrical lockout/NFPA 70E, machine/equipment lockout, confined space, etc...) and any requirements for periodic retraining/recertification are required.
- 3) Procedures for ongoing safety and health training for supervisors and employees shall be established to address changes in site hazards/conditions.
- 4) OSHA 10-hour training is required for all workers on site and the OSHA 30-hour training is required for Trade Competent Persons (CPs)

g. SAFETY AND HEALTH INSPECTIONS.

- 1) Specific assignment of responsibilities for a minimum daily job site safety and health inspection during periods of work activity: Who will conduct (e.g., "Site Safety and Health CP"), proof of inspector's training/qualifications, when inspections will be conducted, procedures for documentation, deficiency tracking system, and follow-up procedures.
- 2) Any external inspections/certifications that may be required (e.g., contracted CSP or CSHT)

h. ACCIDENT/INCIDENT INVESTIGATION & REPORTING. The Contractor shall conduct mishap investigations of all Moderate and Major as well as all High Visibility Incidents. The APP shall include accident/incident investigation procedure and identify person(s)

responsible to provide the following to the Government Designated Authority:

- 1) Exposure data (man-hours worked);
- 2) Accident investigation reports;
- 3) Project site injury and illness logs.

i. PLANS (PROGRAMS, PROCEDURES) REQUIRED. Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational, patient, and public safety risks in site-specific compliance and accident prevention plans. These Plans shall include but are not be limited to procedures for addressing the risks associates with the following:

- 1) Emergency response;
- 2) Contingency for severe weather;
- 3) Fire Prevention;
- 4) Medical Support;
- 5) Posting of emergency telephone numbers;
- 6) Prevention of alcohol and drug abuse;
- 7) Site sanitation(housekeeping, drinking water, toilets);
- 8) Night operations and lighting;
- 9) Hazard communication program;
- 10) Welding/Cutting "Hot" work;
- 11) Electrical Safe Work Practices (Electrical LOTO/NFPA 70E);
- 12) General Electrical Safety;
- 13) Hazardous energy control (Machine LOTO);
- 14) Site-Specific Fall Protection & Prevention;

- 15) Excavation/trenching;
- 16) Asbestos abatement;
- 17) Lead abatement;
- 18) Crane Critical lift;
- 19) Respiratory protection;
- 20) Health hazard control program;
- 21) Radiation Safety Program;
- 22) Abrasive blasting;
- 23) Heat/Cold Stress Monitoring;
- 24) Crystalline Silica Monitoring (Assessment);
- 25) Demolition plan (to include engineering survey);
- 26) Formwork and shoring erection and removal;
- 27) PreCast Concrete;
- 28) Public (Mandatory compliance with ANSI/ASSE A10.34-2012).

C. Submit the APP to the Government Designated Authority for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 [fifteen] calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

D. Once accepted by the Government Designated Authority, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer in accordance with FAR Clause 52.236-13, *Accident Prevention*, until the matter has been rectified.

E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Government Designated Authority.

Should any severe hazard exposure, i.e. imminent danger, become

evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public and the environment.

1.5 ACTIVITY HAZARD ANALYSES (AHAS) :

- A. AHAs are also known as Job Hazard Analyses, Job Safety Analyses, and Activity Safety Analyses. Before beginning each work activity involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or sub-contractor is to perform the work, the Contractor(s) performing that work activity shall prepare an AHA (Example electronic AHA forms can be found on the US Army Corps of Engineers web site)
- B. AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.
- C. Work shall not begin until the AHA for the work activity has been accepted by the Government Designated Authority and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
 - 1. The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by OSHA and/or other State and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.
 - 2. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).

- a. If more than one Competent/Qualified Person is used on the AHA activity, a list of names shall be submitted as an attachment to the AHA. Those listed must be Competent/Qualified for the type of work involved in the AHA and familiar with current site safety issues.
 - b. If a new Competent/Qualified Person (not on the original list) is added, the list shall be updated (an administrative action not requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.
3. Submit AHAs to the Government Designated Authority for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES for review at least 15 [fifteen] calendar days prior to the start of each phase. Subsequent AHAs as shall be formatted as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.
 4. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.
 5. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and then submitted to the Government Designated Authority.

1.6 PRECONSTRUCTION CONFERENCE:

- A. Contractor representatives who have a responsibility or significant role in implementation of the accident prevention program, as required by 29 CFR 1926.20(b)(1), on the project shall attend the preconstruction conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor

superintendents, and any other assigned safety and health professionals.

- B. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.
- C. Deficiencies in the submitted APP will be brought to the attention of the Contractor within 14 [fourteen] days of submittal, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

1.7 "SITE SAFETY AND HEALTH OFFICER" (SSHO) AND "COMPETENT PERSON" (CP) :

- A. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the SSHO to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b) (2) that will be identified as a CP to administer their individual safety programs.
- B. Further, all specialized Competent Persons for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).

- D. The SSHO or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. CPs will maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.
- E. The repeated presence of uncontrolled hazards during a contractor's work operations will result in the designated CP as being deemed incompetent and result in the required removal of the employee in accordance with FAR Clause 52.236-5: Material and Workmanship, Paragraph (c).

1.8 TRAINING:

- A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.
- B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.
- C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work

operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.

- D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.
- E. Submit training records associated with the above training requirements to the Government Designated Authority for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 [fifteen] calendar days prior to the date of the preconstruction conference for acceptance.
- F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures, accident reporting etc... Documentation shall be provided to the Contracting Officer Representative that individuals have undergone contractor's safety briefing.
- G. Ongoing safety training will be accomplished in the form of weekly documented safety meeting.

1.9 INSPECTIONS:

- A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to the Government Designated Authority.

1.10 ACCIDENTS, OSHA 300 LOGS, AND MAN-HOURS:

- A. The prime contractor shall establish and maintain an accident reporting, recordkeeping, and analysis system to track and analyze all injuries and illnesses, high visibility incidents, and accidental property damage (both government and contractor) that occur on site. Notify the Government Designated Authority as soon as practical, but no more than four hours after any accident meeting the definition of a Moderate or Major incidents, High Visibility Incidents, , or any weight handling and hoisting equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Government Designated Authority determine whether a government investigation will be conducted.
- B. Conduct an accident investigation for all Minor, Moderate and Major incidents as defined in paragraph DEFINITIONS, and property damage accidents resulting in at least \$20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162 (or equivalent) , and provide the report to the Project Manager and Facility Safety Manager Officer or Contracting Officer Representative or Government Designated Authority within 5 [__] calendar days of the accident. The Contracting Officer Representative or Government Designated Authority will provide copies of any required or special forms.
- C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month will be reported to the Contracting Officer Representative or Government Designated Authority monthly.
- D. A summation of all Minor, Moderate, and Major incidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the Contracting Officer Representative or Government Designated Authority monthly. The contractor and associated

sub-contractors' OSHA 300 logs will be made available to the Government Designated Authority as requested.

1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE) :

A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.

B. Mandatory PPE includes:

1. Hard Hats - unless written authorization is given by the Government Designated Authority in circumstances of work operations that have limited potential for falling object hazards such as during finishing work or minor remodeling. With authorization to relax the requirement of hard hats, if a worker becomes exposed to an overhead falling object hazard, then hard hats would be required in accordance with the OSHA regulations.
2. Safety glasses - unless written authorization is given by the Contracting Officer Representative or Government Designated Authority in circumstances of no eye hazards, appropriate safety glasses meeting the ANSI Z.87.1 standard must be worn by each person on site.
3. Appropriate Safety Shoes - based on the hazards present, safety shoes meeting the requirements of ASTM F2413-11 shall be worn by each person on site unless written authorization is given by the Government Designated Authority in circumstances of no foot hazards.
4. Hearing protection - Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks.

1.12 INFECTION CONTROL

A. Infection Control is critical in all medical center facilities. Interior construction activities causing disturbance of existing dust, or creating new dust, must be conducted within ventilation-controlled areas that minimize the flow of airborne particles into patient areas.

Exterior construction activities causing disturbance of soil or creates dust in some other manner must be controlled.

- B. An AHA associated with infection control will be performed by VA personnel in accordance with FGI Guidelines (i.e. Infection Control Risk Assessment (ICRA)). The ICRA procedure found on the American Society for Healthcare Engineering (ASHE) website will be utilized. Risk classifications of Class II or lower will require approval by the Government Designated Authority before beginning any construction work. Risk classifications of Class III or higher will require a permit before beginning any construction work. Infection Control permits will be issued by the Resident Engineer. The Infection Control Permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if the work is located in separate areas requiring separate classes. The primary project scope area for this project is noted in drawings, however, work outside the primary project scope area may vary. The required infection control precautions with each class are as follows:

1. Class I requirements:

a. During Construction Work:

- 1) Notify the Government Designated Authority
- 2) Execute work by methods to minimize raising dust from construction operations.
- 3) Ceiling tiles: Immediately replace a ceiling tiles displaced for visual inspection.

b. Upon Completion:

- 1) Clean work area upon completion of task
- 2) Notify the Government Designated Authority

2. Class II requirements:

a. During Construction Work:

- 1) Notify the Government Designated Authority

- 2) Provide active means to prevent airborne dust from dispersing into atmosphere such as wet methods or tool mounted dust collectors where possible.
- 3) Water mist work surfaces to control dust while cutting.
- 4) Seal unused doors with duct tape.
- 5) Block off and seal air vents.
- 6) Remove or isolate HVAC system in areas where work is being performed.

b. Upon Completion:

- 1) Wipe work surfaces with cleaner/disinfectant.
- 2) Contain construction waste before transport in tightly covered containers.
- 3) Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.
- 4) Upon completion, restore HVAC system where work was performed
- 5) Notify the Government Designated Authority

3. Class III requirements:

a. During Construction Work:

- 1) Obtain permit from the Government Designated Authority
- 2) Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.
- 3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.

- 4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.
- 5) Contain construction waste before transport in tightly covered containers.
- 6) Cover transport receptacles or carts. Tape covering unless solid lid.

b. Upon Completion:

- 1) Do not remove barriers from work area until completed project is inspected by the Government Designated Authority and thoroughly cleaned by the VA Environmental Services Department.
- 2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
- 3) Vacuum work area with HEPA filtered vacuums.
- 4) Wet mop area with cleaner/disinfectant.
- 5) Upon completion, restore HVAC system where work was performed.
- 6) Return permit to the Government Designated Authority

4. Class IV requirements:

a. During Construction Work:

- 1) Obtain permit from the Government Designated Authority
- 2) Isolate HVAC system in area where work is being done to prevent contamination of duct system.
- 3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control

cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.

- 4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.
- 5) Seal holes, pipes, conduits, and punctures.
- 6) Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site.
- 7) All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.

b. Upon Completion:

- 1) Do not remove barriers from work area until completed project is inspected by the Contracting Officer Representative or Government Designated Authority with thorough cleaning by the VA Environmental Services Dept.
- 2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
- 3) Contain construction waste before transport in tightly covered containers.
- 4) Cover transport receptacles or carts. Tape covering unless solid lid.
- 5) Vacuum work area with HEPA filtered vacuums.

6) Wet mop area with cleaner/disinfectant.

7) Upon completion, restore HVAC system where work was performed.

8) Return permit to the Government Designated Authority

C. Barriers shall be erected as required based upon classification (Class III & IV requires barriers) and shall be constructed as follows:

1. Class III and IV - closed door with masking tape applied over the frame and door is acceptable for projects that can be contained in a single room.
2. Construction, demolition or reconstruction not capable of containment within a single room must have the following barriers erected and made presentable on hospital occupied side:
 - a. Class III & IV (where dust control is the only hazard, and an agreement is reached with the Resident Engineer and Medical Center) - Airtight plastic barrier that extends from the floor to ceiling. Seams must be sealed with duct tape to prevent dust and debris from escaping
 - b. Class III & IV - Drywall barrier erected with joints covered or sealed to prevent dust and debris from escaping.
 - c. Class III & IV - Seal all penetrations in existing barrier airtight
 - d. Class III & IV - Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement air and debris
 - e. Class IV only - Anteroom or double entrance openings that allow workers to remove protective clothing or vacuum off existing clothing
 - f. Class III & IV - At elevators shafts or stairways within the field of construction, overlapping flap minimum of two feet wide of polyethylene enclosures for personnel access.

D. Products and Materials:

1. Sheet Plastic: Fire retardant polystyrene, 6-mil thickness meeting local fire codes
 2. Barrier Doors: Self Closing fire-rated to match the wall assembly solid core wood in steel frame, painted
 3. Dust proof fire-rated to match the wall assembly, drywall
 4. High Efficiency Particulate Air-Equipped filtration machine rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Maintenance of equipment and replacement of the HEPA filters and other filters will be in accordance with manufacturer's instructions.
 5. Exhaust Hoses: Heavy duty, flexible steel reinforced; Ventilation Blower Hose
 6. Adhesive Walk-off Mats: Provide minimum size mats of 24 inches x 36 inches
 7. Disinfectant: Hospital-approved disinfectant or equivalent product
 8. Portable Ceiling Access Module
- E. Before any construction on site begins, all contractor personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- F. A dust control program will be established and maintained as part of the contractor's infection preventive measures in accordance with the FGI Guidelines for Design and Construction of Healthcare Facilities. Prior to start of work, prepare a plan detailing project-specific dust protection measures with associated product data, including periodic status reports, and submit to Engineer and Facility CSC for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

- G. Medical center Infection Control personnel will monitor for airborne disease (e.g. aspergillosis) during construction. A baseline of conditions will be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality with safe thresholds established.
- H. In general, the following preventive measures shall be adopted during construction to keep down dust and prevent mold.
1. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. HEPA filtration is required where the exhaust dust may reenter the medical center.
 2. Exhaust hoses shall be exhausted so that dust is not reintroduced to the medical center.
 3. Adhesive Walk-off/Carpet Walk-off Mats shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
 4. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as it is created. Transport these outside the construction area in containers with tightly fitting lids.
 5. The contractor shall not haul debris through patient-care areas without prior approval of the Resident Engineer and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.

6. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.
7. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.

I. Final Cleanup:

1. Upon completion of project, or as work progresses, remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.
2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.
3. All new air ducts shall be cleaned prior to final inspection.

J. Exterior Construction

1. Contractor shall verify that dust will not be introduced into the medical center through intake vents, or building openings. HEPA filtration on intake vents is required where dust may be introduced.
2. Dust created from disturbance of soil such as from vehicle movement will be wetted with use of a water truck as necessary
3. All cutting, drilling, grinding, sanding, or disturbance of materials shall be accomplished with tools equipped with either local exhaust ventilation (i.e. vacuum systems) or wet suppression controls.

K. ICRA Class per building and area immediately follows below.

1. All afterhours work noted in schedule to be coordinated with C.O.R. Contractor has normal working hours option in areas noted as "No restrictions" in schedule below unless construction time line

requires work to be conducted after normal hours to maintain construction schedule.

2. Contractor to develop and coordinate construction traffic patterns with C.O.R. prior to commencement of work.

Building	Floor	Area Description	ICRA	Hours	Hours	NOTES
			Class	Occupied	G.C. Work	
1	Basement	Offices	II	0800-1630	No restrictions	
	First	Offices	II	0800-1630	No restrictions	
	Second	Offices	II	0800-1630	No restrictions	
	Second	Mental Health	II	0800-1630	After 1700 hrs	Area noted on drawings
	Third	Offices	II	0800-1600	No restrictions	
2	Sub-basement	Offices	II	0800-1600	No restrictions	
	Basement	Offices	II	0800-1600	No restrictions	
	First	Dining	II	Breakfast, lunch, diner	After hours	Work to be conducted after dining hours, coordinate with C.O.R.
	First	Kitchen	III	0600-1800	After 1800 hrs	After dining hours, coordinate with C.O.R.
	Second	Clinic	II	0800-1630	After 1700 hrs	
3	Basement	Volunteers	II		No restrictions	
	First	Nat. Call Center	II		No restrictions	
	Second	Nat. Call Center	II		No restrictions	
4	Basement	Nat. Call Center	II		No restrictions	
	First	Nat. Call Center	II		No restrictions	
	Second	Nat. Call Center	II		No restrictions	
5	Basement	Kitchen	III	0700-1430	After 1500 hrs	After dining hours, coordinate with C.O.R.
	Basement	Retail	II		No restrictions	
	First	Resident floor	III	0-2400	0800-1630 hrs	Patient area
	Second	Isolation Ward	III	0-2400	0800-1630 hrs	Occupancy may vary at time of construction, coordinate with C.O.R.
6	Basement	DOM Quarters	II	0700-1530	0700-1530 hrs	Work cannot occur after hours.
	First	DOM Quarters	II		No restrictions	
	Second	Patient Activities	II			Work around schedule of use, coordinate with
7	Basement	Patient Activities	II			Work around schedule of use, coordinate with
	First	Resident floor	III	0-2400	0800-1630 hrs	Patient area
	Second	Resident floor	III	0-2400	0800-1630 hrs	Patient area
8	Basement	Storage	II	0800-1600	No restrictions	
	First	Resident floor	III	0-2400	0800-1630 hrs	Patient area
	Second	Resident floor	III	0-2400	0800-1630 hrs	Patient area
9	Basement	Storage	II		No restrictions	
	First	Chapel	II	Sundays	No restrictions	No work on Sundays and religious holidays
10	Basement		II		No restrictions	
	First	Chapel	II	Sundays	No restrictions	No work on Sundays and religious holidays
11	Basement	Call Center	II	0800-1630	After 1700 hrs	Connector corridor work: no restrictions
	First		II		No restrictions	
	Second		II		No restrictions	

Building	Floor	Area Description	ICRA	Hours	Hours	NOTES
			Class	Occupied	G.C. Work	
12	Basement	Sector A: Clinic	III	0800-1630	After 1700 hrs	Area noted on drawings
	Basement	Sector A: Files	II	0800-1630	No restrictions	
	Basement	Sector C, D: Central Sterile	IV	0800-1630	After 1700 hrs	Area noted on drawings
	Basement	Sector C, D: Offices	II		No restrictions	Area noted on drawings
	Ground	Sector A: Urgent Care	III	0700-2000	After 2000 hours	Area noted on drawings
	Ground	Sector A: Clinic	III	0700-1630	After 1700 hrs	Area noted on drawings
	Ground	Sector B: Imaging	III	0800-1630	After 1700 hrs	
	Ground	Sector B: Clinic	III		No restrictions	
	Ground	Sector C, D: Comp. Rx	IV	0800-1630	0800-1630 hrs	Compounding Pharmacy; area noted on drawings
	Ground	Sector C, D: Rx	IV	0800-1630	No restrictions	Pharmacy
	First	Sector A: Acute Care	IV	0-2400	0800-1630 hrs	
	First	Sector B: Eye Clinic	III	0800-1630	After 1700 hrs	
	First	Sector C, D: Dental	III	0800-1630	After 1700 hrs	
	First	Sector C, D: Offices	II		No restrictions	
	Second	Sector A: Sterile Strg	IV	0800-1630	0800-1630 hrs	Note area to be coordinated indicated in drawings
	Second	Sector B: Dialysis	IV	High use	Weekends	Saturday after 1600 hrs to Monday 0500 hrs
	Second	Sector B: Offices	II	0800-1630	0800-1630 hrs	
	Second	Sector C, D: Sp. Clinic	III	0800-1630	After 1700 hrs	Area noted on drawings
	Second	Sector C, D: Dialysis	IV	High use	Weekends	Saturday after 1600 hrs to Monday 0500 hrs
	Second	Sector C, D: Offices	II	0800-1630	0800-1630 hrs	
	Third	Sector B: Offices	II		No restrictions	
	Third	Sector C, D: Biomed	II		No restrictions	
	Third	Sector C, D: Sleep Lab	III	2000-0800	0800-1630 hrs	
	Third	Sector C, D: Respiratory	III	0800-1630	After 1700 hrs	Area noted on drawings
	Third	Sector C, D: Admin	II	0800-1630	After 1700 hrs	Area noted on drawings
	Fourth	Lab Admin	II		No restrictions	
	Fourth	Laboratory	IV	0800-1630	0800-1630 hrs	
13	First	Painter/pipefitter	I		No restrictions	
14	First	Engineering	II		No restrictions	
17	First	Garage	I		No restrictions	
18	First	Engineering	I		No restrictions	
20	Basement	Residence	II		No restrictions	
	First	Residence	II		No restrictions	
23	Basement	Residence	I		No restrictions	
29	Basement	Residence	II	0800-1630	0800-1630 hrs	
43	Basement	Laundry	I	0800-1630	0800-1630 hrs	
53	Basement		II	0800-1630	0800-1630 hrs	
	Ground	Kitchen	III	0700-1430	After 1500 hrs	After dining hours, coordinate with C.O.R.
	First	Call Center	II	0800-1630	After 1700 hrs	
	First	Library	II		No restrictions	Coordinate with C.O.R.
65	Ground	MCR	III		0800-1630 hrs	
	Ground	Offices	II	0800-1630	0800-1630 hrs	
66	Ground	Police, FD	II	0800-1630	0800-1630 hrs	

1.13 TUBERCULOSIS SCREENING

A. Contractor shall provide written certification that all contract

employees assigned to the work site have had a pre-placement tuberculin

screening within 90 days prior to assignment to the worksite and been found have negative TB screening reactions. Contractors shall be required to show documentation of negative TB screening reactions for any additional workers who are added after the 90-day requirement before they will be allowed to work on the work site. NOTE: This can be the Center for Disease Control (CDC) and Prevention and two-step skin testing or a Food and Drug Administration (FDA)-approved blood test.

1. Contract employees manifesting positive screening reactions to the tuberculin shall be examined according to current CDC guidelines prior to working on VHA property.
2. Subsequently, if the employee is found without evidence of active (infectious) pulmonary TB, a statement documenting examination by a physician shall be on file with the employer (construction contractor), noting that the employee with a positive tuberculin screening test is without evidence of active (infectious) pulmonary TB.
3. If the employee is found with evidence of active (infectious) pulmonary TB, the employee shall require treatment with a subsequent statement to the fact on file with the employer before being allowed to return to work on VHA property.

1.14 FIRE SAFETY

- A. Fire Safety Plan: Establish and maintain a site-specific 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 Government Designated Authority for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. This plan may be an element of the Accident Prevention Plan.
- B. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.

C. 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).

D. Temporary Construction Partitions:

1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas the areas that are described in phasing requirements and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, $\frac{3}{4}$ hour fire/smoke rated doors with self-closing devices.
2. Install fire-rated, temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.

E. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.

F. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Government Designated Authority.

G. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Government Designated Authority.

- H. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- I. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- J. Standpipes: Install and extend standpipes up with each floor in accordance with 29 CFR 1926 and NFPA 241. Do not charge wet standpipes subject to freezing until weather protected.
- K. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.
- L. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with or Government Designated Authority. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.
- M. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Contracting Officer Representative or Government Designated Authority.
- N. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Facility Safety Office. Obtain permits from facility Safety Officer at least 48 hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.
- O. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Government Designated Authority.

- P. 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.
- Q. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- R. If required, submit documentation to the COR or other Government Designated Authority that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

1.15 ELECTRICAL

- A. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, 29 CFR Part 1910 Subpart J - General Environmental Controls, 29 CFR Part 1910 Subpart S - Electrical, and 29 CFR 1926 Subpart K in addition to other references required by contract.
- B. All qualified persons performing electrical work under this contract shall be licensed journeyman or master electricians. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.
- C. All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition (refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination in accordance with FAR clause 52.236-5(c). Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The Contracting Officer Representative or Government Designated Authority with approval of the Medical Center Director will make the determination if the circumstances would meet the exception outlined above. An AHA and permit specific to energized work activities will be

developed, reviewed, and accepted by the VA prior to the start of that activity.

1. Development of a Hazardous Electrical Energy Control Procedure is required prior to de-energization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.
2. Verification of the absence of voltage after de-energization and lockout/tagout is considered "energized electrical work" (live work) under NFPA 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.
3. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the Government Designated Authority.

D. Before beginning any electrical work, an Activity Hazard Analysis (AHA) will be conducted to include Shock Hazard and Arc Flash Hazard analyses (NFPA Tables can be used only as a last alternative and it is strongly suggested a full Arc Flash Hazard Analyses be conducted). Work shall not begin until the AHA for the work activity and permit for energized work has been reviewed and accepted by the Government Designated Authority and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.

E. Ground-fault circuit interrupters. GFCI protection shall be provided where an employee is operating or using cord- and plug-connected tools related to construction activity supplied by 125-volt, 15-, 20-, or 30-ampere circuits. Where employees operate or use equipment supplied by greater than 125-volt, 15-, 20-, or 30- ampere circuits, GFCI

protection or an assured equipment grounding conductor program shall be implemented in accordance with NFPA 70E - 2015, Chapter 1, Article 110.4(C) (2) ..

1.16 FALL PROTECTION

- A. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.
 - 1. The use of a Safety Monitoring System (SMS) as a fall protection method is prohibited.
 - 2. The use of Controlled Access Zone (CAZ) as a fall protection method is prohibited.
 - 3. A Warning Line System (WLS) may ONLY be used on floors or flat or low-sloped roofs (between 0 - 18.4 degrees or 4:12 slope) and shall be erected around all sides of the work area (See 29 CFR 1926.502(f) for construction of WLS requirements). Working within the WLS does not require FP. No worker shall be allowed in the area between the roof or floor edge and the WLS without FP. FP is required when working outside the WLS.
 - 4. Fall protection while using a ladder will be governed by the OSHA requirements.

1.17 SCAFFOLDS AND OTHER WORK PLATFORMS

- A. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L.
- B. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) as stated in Section 1.16.
- C. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.

1. Scaffolds, platforms, or temporary floors shall be provided for all work except that can be performed safely from the ground or similar footing.
 2. Ladders less than 20 feet may be used as work platforms only when use of small hand tools or handling of light material is involved.
 3. Ladder jacks, lean-to, and prop-scaffolds are prohibited.
 4. Emergency descent devices shall not be used as working platforms.
- D. Contractors shall use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags shall be color-coded: green indicates the scaffold has been inspected and is safe to use; red indicates the scaffold is unsafe to use. Tags shall be readily visible, made of materials that will withstand the environment in which they are used, be legible and shall include:
1. The Competent Person's name and signature;
 2. Dates of initial and last inspections.
- E. Mast Climbing work platforms: When access ladders, including masts designed as ladders, exceed 20 ft (6 m) in height, positive fall protection shall be used.

1.18 EXCAVATION AND TRENCHES

- A. All excavation and trenching work shall comply with 29 CFR 1926 Subpart P. Excavations less than 5 feet in depth require evaluation by the contractor's "Competent Person" (CP) for determination of the necessity of an excavation protective system where kneeling, laying in, or stooping within the excavation is required.
- B. All excavations and trenches 24 inches in depth or greater shall require a written trenching and excavation permit (NOTE - some States and other local jurisdictions require separate state/jurisdiction-issued excavation permits). The permit shall have two sections, one section will be completed prior to digging or drilling and the other will be completed prior to personnel entering the excavations greater than 5 feet in depth. Each section of the permit shall be provided to

the Government Designated Authority prior to proceeding with digging or drilling and prior to proceeding with entering the excavation. After completion of the work and prior to opening a new section of an excavation, the permit shall be closed out and provided to the Government Designated Authority. The permit shall be maintained onsite and the first section of the permit shall include the following:

1. Estimated start time & stop time. Specific location and nature of the work.
2. Indication of the contractor's "Competent Person" (CP) in excavation safety with qualifications and signature. Formal course in excavation safety is required by the contractor's CP.
3. Indication of whether soil or concrete removal to an offsite location is necessary.
4. Indication of whether soil samples are required to determine soil contamination.
5. Indication of coordination with local authority (i.e. "One Call") or contractor's effort to determine utility location with search and survey equipment.
6. Indication of review of site drawings for proximity of utilities to digging/drilling.

C. The second section of the permit for excavations greater than five feet in depth shall include the following:

1. Determination of OSHA classification of soil. Soil samples will be from freshly dug soil with samples taken from different soil type layers as necessary and placed at a safe distance from the excavation by the excavating equipment. A pocket penetrometer will be utilized in determination of the unconfined compression strength of the soil for comparison against OSHA table (Less than 0.5 Tons/FT² - Type C, 0.5 Tons/FT² to 1.5 Tons/FT² - Type B, greater than 1.5 Tons/FT² - Type A without condition to reduce to Type B).

2. Indication of selected protective system (sloping/benching, shoring, shielding). When soil classification is identified as "Type A" or "Solid Rock", only shoring or shielding or Professional Engineer designed systems can be used for protection. A Sloping/Benching system may only be used when classifying the soil as Type B or Type C. Refer to Appendix B of 29 CFR 1926, Subpart P for further information on protective systems designs.
 3. Indication of the spoil pile being stored at least 2 feet from the edge of the excavation and safe access being provided within 25 feet of the workers.
 4. Indication of assessment for a potential toxic, explosive, or oxygen deficient atmosphere where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist. Internal combustion engine equipment is not allowed in an excavation without providing force air ventilation to lower the concentration to below OSHA PELs, providing sufficient oxygen levels, and atmospheric testing as necessary to ensure safe levels are maintained.
- D As required by OSHA 29 CFR 1926.651(b)(1), the estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.
1. The planned dig site will be outlined/marked in white prior to locating the utilities.
 2. Used of the American Public Works Association Uniform Color Code is required for the marking of the proposed excavation and located utilities.
 3. 811 will be called two business days before digging on all local or State lands and public Right-of Ways.
 4. Digging will not commence until all known utilities are marked.

5. Utility markings will be maintained

- E. Excavations will be hand dug or excavated by other similar safe and acceptable means as excavation operations approach within 5 feet of identified underground utilities. Exploratory bar or other detection equipment will be utilized as necessary to further identify the location of underground utilities.
- F. Excavations greater than 20 feet in depth require a Professional Engineer designed excavation protective system.

1.19 CRANES

- A. All crane work shall comply with 29 CFR 1926 Subpart CC.
- B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no "Phase In" date.
- C. A detailed lift plan for all lifts shall be submitted to the Government Designated Authority 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing and all other elements of a critical lift plan where the lift meets the definition of a critical lift. Critical lifts require a more comprehensive lift plan to minimize the potential of crane failure and/or catastrophic loss. The plan must be reviewed and accepted by the General Contractor before being submitted to the VA for review. The lift will not be allowed to proceed without prior acceptance of this document.
- D. Crane operators shall not carry loads
 - 1. over the general public or VAMC personnel
 - 2. over any occupied building unless
 - a. the top two floors are vacated
 - b. or overhead protection with a design live load of 300 psf is provided

1.20 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

- A. All installation, maintenance, and servicing of equipment or machinery shall comply with 29 CFR 1910.147 except for specifically referenced operations in 29 CFR 1926 such as concrete & masonry equipment [1926.702(j)], heavy machinery & equipment [1926.600(a)(3)(i)], and process safety management of highly hazardous chemicals (1926.64). Control of hazardous electrical energy during the installation, maintenance, or servicing of electrical equipment shall comply with Section 1.15 to include NFPA 70E and other VA specific requirements discussed in the section.

1.21 CONFINED SPACE ENTRY

- A. All confined space entry shall comply with 29 CFR 1926, Subpart AA except for specifically referenced operations in 29 CFR 1926 such as excavations/trenches [1926.651(g)].
- B. A site-specific Confined Space Entry Plan (including permitting process) shall be developed and submitted to the Government Designated Authority.

1.22 WELDING AND CUTTING

As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with the Government Designated Authority. Obtain permits from Government Designated Authority at least 48 hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

1.23 LADDERS

- A. All Ladder use shall comply with 29 CFR 1926 Subpart X.
- B. All portable ladders shall be of sufficient length and shall be placed so that workers will not stretch or assume a hazardous position.
- C. Manufacturer safety labels shall be in place on ladders
- D. Step Ladders shall not be used in the closed position
- E. Top steps or cap of step ladders shall not be used as a step

F. Portable ladders, used as temporary access, shall extend at least 3 ft (0.9 m) above the upper landing surface.

1. When a 3 ft (0.9-m) extension is not possible, a grasping device (such as a grab rail) shall be provided to assist workers in mounting and dismounting the ladder.
2. In no case shall the length of the ladder be such that ladder deflection under a load would, by itself, cause the ladder to slip from its support.

G. Ladders shall be inspected for visible defects on a daily basis and after any occurrence that could affect their safe use. Broken or damaged ladders shall be immediately tagged "DO NOT USE," or with similar wording, and withdrawn from service until restored to a condition meeting their original design.

1.24 FLOOR & WALL OPENINGS

A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M.

B. Floor and roof holes/openings are any that measure over 2 in (51 mm) in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. Skylights located in floors or roofs are considered floor or roof hole/openings.

C. All floor, roof openings or hole into which a person can accidentally walk or fall through shall be guarded either by a railing system with toeboards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.

1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.
2. Covers shall be secured when installed, clearly marked with the word "HOLE", "COVER" or "Danger, Roof Opening-Do Not Remove" or color-coded or equivalent methods (e.g., red or orange "X"). Workers must

be made aware of the meaning for color coding and equivalent methods.

3. Roofing material, such as roofing membrane, insulation or felts, covering or partly covering openings or holes, shall be immediately cut out. No hole or opening shall be left unattended unless covered.
4. Non-load-bearing skylights shall be guarded by a load-bearing skylight screen, cover, or railing system along all exposed sides.
5. Workers are prohibited from standing/walking on skylights.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

**SECTION 01 42 19
REFERENCE STANDARDS**

PART 1 - GENERAL

1.1 DESCRIPTION

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)

The specifications and standards cited in this solicitation can be examined at the following location:

DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
425 Eye Street N.W, (sixth floor)
Washington, DC 20001

Telephone Numbers: (202) 632-5249 or (202) 632-5178
Between 9:00 AM - 3:00 PM

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)

The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AA	Aluminum Association Inc. http://www.aluminum.org
AABC	Associated Air Balance Council https://www.aabc.com
AAMA	American Architectural Manufacturer's Association http://www.aamanet.org
AASHTO	American Association of State Highway and Transportation Officials http://www.aashto.org
AATCC	American Association of Textile Chemists and Colorists http://www.aatcc.org
ACGIH	American Conference of Governmental Industrial Hygienists http://www.acgih.org
ACI	American Concrete Institute http://www.aci-int.net
ACPA	American Concrete Pipe Association http://www.concrete-pipe.org
ACPPA	American Concrete Pressure Pipe Association http://www.acppa.org
ADC	Air Diffusion Council http://flexibleduct.org
AGA	American Gas Association http://www.aga.org

AGC	Associated General Contractors of America http://www.agc.org
AGMA	American Gear Manufacturers Association, Inc. http://www.agma.org
AH	American Hort https://www.americanhort.org
AHAM	Association of Home Appliance Manufacturers http://www.aham.org
AIA	American Institute of Architects http://www.aia.org
AISC	American Institute of Steel Construction http://www.aisc.org
AISI	American Iron and Steel Institute http://www.steel.org
AITC	American Institute of Timber Construction https://aitc-glulam.org
AMCA	Air Movement and Control Association, Inc. http://www.amca.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
APA	The Engineered Wood Association http://www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute http://www.ari.org
ARPM	Association for Rubber Product Manufacturers https://arpm.com

ASABE American Society of Agricultural and Biological Engineers
<https://www.asabe.org>

ASCE American Society of Civil Engineers
<http://www.asce.org>

ASHRAE American Society of Heating, Refrigerating, and
Air-Conditioning Engineers
<http://www.ashrae.org>

ASME American Society of Mechanical Engineers
<http://www.asme.org>

ASSE American Society of Sanitary Engineering International
<http://www.asse-plumbing.org>

ASTM American Society for Testing and Materials International
<http://www.astm.org>

AWI Architectural Woodwork Institute
<https://www.awinet.org>

AWS American Welding Society
<https://www.aws.org>

AWWA American Water Works Association
<https://www.awwa.org>

BHMA Builders Hardware Manufacturers Association
<https://www.buildershardware.com>

BIA The Brick Industry Association
<http://www.gobrick.com>

CAGI Compressed Air and Gas Institute
<https://www.cagi.org>

CGA Compressed Gas Association, Inc.
<https://www.cganet.com>

CI The Chlorine Institute, Inc.
<https://www.chlorineinstitute.org>

CISCA Ceilings and Interior Systems Construction Association
<https://www.cisca.org>

CISPI Cast Iron Soil Pipe Institute
<https://www.cispi.org>

CLFMI Chain Link Fence Manufacturers Institute
<https://www.chainlinkinfo.org>

CPA Composite Panel Association
<https://www.compositepanel.org>

CPMB Concrete Plant Manufacturers Bureau
<https://www.cpmc.org>

CRA California Redwood Association
<http://www.calredwood.org>

CRSI Concrete Reinforcing Steel Institute
<https://www.crsi.org>

CTI Cooling Technology Institute
<https://www.cti.org>

DHA Decorative Hardwoods Association
<https://www.decorativehardwoods.org>

DHI Door and Hardware Institute
<https://www.dhi.org>

EGSA Electrical Generating Systems Association
<http://www.egsa.org>

EEI Edison Electric Institute
<https://www.eei.org>

EPA United States Environmental Protection Agency
<https://www.epa.gov>

ETL ETL Testing Services
<http://www.intertek.com>

FAA	Federal Aviation Administration https://www.faa.gov
FCC	Federal Communications Commission https://www.fcc.gov
FPS	Forest Products Society http://www.forestprod.org
GANA	Glass Association of North America http://www.glasswebsite.com
FM	Factory Mutual Global Insurance https://www.fmglobal.com
GA	Gypsum Association https://gypsum.org
GSA	General Services Administration https://www.gsa.gov
HI	Hydraulic Institute http://www.pumps.org
ICC	International Code Council https://shop.iccsafe.org
ICEA	Insulated Cable Engineers Association https://www.icea.net
ICAC	Institute of Clean Air Companies http://www.icac.com
IEEE	Institute of Electrical and Electronics Engineers https://www.ieee.org/
IGMA	Insulating Glass Manufacturers Alliance https://www.igmaonline.org
IMSA	International Municipal Signal Association http://www.imsasafety.org

MBMA	Metal Building Manufacturers Association https://www.mbma.com
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry http://msshq.org
NAAMM	National Association of Architectural Metal Manufacturers https://www.naamm.org
PHCC	Plumbing-Heating-Cooling Contractors Association https://www.phccweb.org
NBS	National Bureau of Standards See - NIST
NBBI	The National Board of Boiler and Pressure Vessel Inspectors https://www.nationalboard.org
NEC	National Electric Code See - NFPA National Fire Protection Association
NEMA	National Electrical Manufacturers Association https://www.nema.org
NFPA	National Fire Protection Association https://www.nfpa.org
NHLA	National Hardwood Lumber Association https://www.nhla.com
NIH	National Institute of Health https://www.nih.gov
NIST	National Institute of Standards and Technology https://www.nist.gov
NELMA	Northeastern Lumber Manufacturers Association, Inc. http://www.nelma.org
NPA	National Particleboard Association (See CPA, Composite Panel Association)

NSF	National Sanitation Foundation http://www.nsf.org
OSHA	Occupational Safety and Health Administration Department of Labor https://www.osha.gov
PCA	Portland Cement Association https://www.cement.org
PCI	Precast Prestressed Concrete Institute https://www.pci.org
PPI	Plastics Pipe Institute https://www.plasticpipe.org
PEI	Porcelain Enamel Institute http://www.porcelainenamel.com
PTI	Post-Tensioning Institute http://www.post-tensioning.org
RFCI	Resilient Floor Covering Institute https://www.rfci.com
RIS	Redwood Inspection Service (See Western Wood Products Association) https://www.wwpa.org
SCMA	Southern Cypress Manufacturers Association http://www.cypressinfo.org
SDI	Steel Door Institute http://www.steeldoor.org
SJI	Steel Joist Institute https://www.steeljoist.org
SMACNA	Sheet Metal & Air-Conditioning Contractors' National Association https://www.smacna.org

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

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

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

TCNA Tile Council of North America
<https://www.tcnatile.com>

TEMA Tubular Exchanger Manufacturers Association
<http://www.tema.org>

TPI Truss Plate Institute
<https://www.tpinst.org>

UBC The Uniform Building Code
(See ICC)

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

ULC Underwriters' Laboratories of Canada
<https://www.ulc.ca>

WCLB West Coast Lumber Inspection Bureau
<http://www.wclib.org>

WDMA Window and Door Manufacturers Association
<https://www.wdma.com>

WRCLA Western Red Cedar Lumber Association
<https://www.realcedar.com>

WWPA Western Wood Products Association
<http://www.wwpa.org>

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 01 45 00
QUALITY CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies requirements for Contractor Quality Control (CQC).

1.2 APPLICABLE PUBLICATIONS

- A. The publication listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. ASTM International (ASTM)
 - 1. D3740-2019 Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
 - 2. E329-2020 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.3 SUBMITTALS

- A. VA approval is required for all submittals. CQC inspection reports shall be submitted under this Specification section and follow the Applicable CQC Control Phase (Preparatory, Initial, or Follow-Up) naming convention.
 - 1. Preconstruction Submittals
 - a. Interim CQC Plan
 - b. CQC Plan

PART 2 PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Establish and maintain an effective quality control (QC) system that complies with the FAR Clause 52.246.12 titled "Inspection of Construction". QC consists of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system covers all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Office or Authorized designee for non-compliance with the quality requirements specified in the Contract. In this context the

highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 CQC PLAN:

- A. Submit no later than 15 days after receipt of Notice to Proceed (NTP) the CQC Plan proposed to implement the requirements of the FAR Clause 52.246.12 titled "Inspection of Construction". The Government will consider an Interim CQC Plan to match timeline established immediately above for the first days of operation, which must be accepted within 10 business days of NTP. Design and/or construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an Interim plan applicable to the particular feature of work to be started. Work outside of the accepted Interim CQC Plan will not be permitted to begin until acceptance of a CQC Plan or another Interim CQC Plan containing the additional work scope is accepted.
- B. Content of the CQC Plan: Include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, designers of record consultants, architects/engineers (A/E), fabricators, suppliers, and purchasing agents:
 1. A description of the QC organization, including a chart showing lines of authority and acknowledgement that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager that reports to the project superintendent.
 2. The name, qualifications (in resume format) duties, responsibilities, and authorities of each person assigned a CQC function.
 3. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Furnish copies of these letters to the COR.
 4. A copy of all letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters to the COR.
 5. Procedures for scheduling, reviewing, certifying, and managing submittals including those of subcontractors,

designers of record, consultants, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

6. Control, verification, and acceptance of testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test.
 - a. Laboratory facilities approved by the CO are required to be used.
7. Procedures for tracking Preparatory, Initial, and Follow-Up control phases and control, verification, and acceptance tests including documentation.
8. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
9. Reporting procedures, including proposed reporting formats.
10. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of specifications can generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the Coordination meeting.

3.3 COORDINATION MEETING:

- A. After the Preconstruction Conference Post-award Conference before start of design or construction, and prior to acceptance by VA of the CQC Plan, meet with the Contracting Officer or Authorized designee to discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 2 business days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CC operations, design activities (if applicable), control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and Contracting Officer or COR and will become a part of the contract file. There can be occasions when subsequent conferences will be called by either party to reconfirm mutual

understandings or address deficiencies in the CQC system or procedures which can require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION:

- A. Personnel Requirements: The requirements for the CQC organization are a Safety and Health Manager, a CQC System Manager, and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager shall satisfy the requirements of Specification 01 35 26, SAFETY REQUIREMENTS, and reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the COR. Provide adequate office space, filing systems, and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawings submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Government.
- B. CQC System Manager: Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor.
1. The CQC system Manager is required to be a construction person with a minimum of five years in related work.
 2. This CQC System manager is on the site at all times during construction and is employed by the General Contractor.
 3. The CQC System Manger is assigned as CQC System Manager but has duties as project superintendent in addition to quality control.
 4. Identify in the plan an alternate to serve in the event of the CDQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.
- C. CQC Personnel:
1. In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization

specialized personnel to assist in the CQC System Manager for the following areas, as applicable: electrical, mechanical, structural, architectural, materials technician, submittals clerk, Commissioning Agent, and low voltage systems. These individuals or specified technical companies are directly employed by the General Contractor and cannot be employed by a supplier or subcontractor on this project; be responsible to the CQC System Manager; be physically present at the construction site during work on the specialized personnel's areas of responsibility; have the necessary education or experience in accordance with the Experience Matrix listed herein. These individuals can perform other duties but need to be allowed sufficient time to perform the specialized personnel's assigned quality controls duties as described in the CQC Plan. A single person can cover more than one area provided that the single person is qualified to perform QC activities in each designated and that workload allows.

- D. Additional Requirements: In addition to the above experience and education requirements, the CQC System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Construction course. If the CQC System Manager does not have a current specification, obtain the CQM for Contractors course identification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer or Authorized designee for information on the next scheduled class.
- E. Organizational Changes: Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the COR for acceptance.

3.5 SUBMITTALS AND DELIVERABLES:

- A. Submittals And Deliverables: Submittals have to comply with the requirements in Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 01 91 00 General Commissioning Requirements is included in the contract, the submittals required by the section have to be coordinated with the Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL:

- A. CQC is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers,

complies with the requirements of the contract. At least three phases of control are required to be conducted by the CQC System Manager for each definable feature of the construction work as follows:

1. Preparatory Phase: This phase is performed prior to beginning work on each definable feature of work after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:
 - a. A review of each paragraph of applicable specifications, references codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.
 - b. Review of the Contract drawings.
 - c. Check to assure that all materials and equipment have been tested, submitted, and approved.
 - d. Review of provisions that have been made to provide required control inspection and testing.
 - e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.
 - f. Examination of required materials, equipment, and sample work to assure that they are on hand conform to approved shop drawings or submitted data, and are properly stored.
 - g. Review of the appropriate Activity Hazard Analysis (AHA) to assure safety requirements are met.
 - h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards - contract defined or industry standard if not contract defined - for that feature of work.
 - i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
 - j. Discussion of the initial control phase.
 - k. VA COR needs to be notified at least 48 hours or 2 business days in advance of beginning the Preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman

responsible for the definable feature. Document the results of the Preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

B. Initial Phase: This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the Preparatory meeting.
2. Verify adequacy of controls to ensure full contract compliance. Verify the required control inspection and testing is in compliance with the contract.
3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
4. Resolve all differences.
5. Check safety to include compliance with an upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
6. VA COR needs to be notified at least 48 hours or 2 business days in advance of beginning the initial phase for definable features of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for definable feature of work for future reference and comparison with Follow-Up phases.
7. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

C. Follow-Up Phase: Perform daily checks to assure control activities,

1. including control testing, are providing continued compliance with contract requirements until the completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final Follow-Up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

D. Additional Preparatory and Initial Phases on the same definable features of work if: the quality ongoing work is unacceptable; if there are changes in the applicable CQC staff, onsite

production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.7 TESTS

- A. Testing Procedure: Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and acceptance test when specified. Procure the services of a Department of Veteran Affairs approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:
1. Verify that testing procedures comply with contract requirements.
 2. Verify that facilities and testing equipment are available and comply with testing standards.
 3. Check test instrument calibration data against certified standards.
 4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
 5. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the unique sequential control number identifying the test. If approved by the COR, actual test reports are submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer or Authorized designee. Failure to submit timely test reports as stated results in nonpayment for related work performed and disapproval of the test facility for this Contract.
- B. Testing Laboratories: All testing laboratories must be validated through the procedures contained in Specification section 01 45 29, TESTING LABORATORY SERVICES.
1. Capability Check: The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques.

- a. Laboratories utilized for testing concrete or steel is required to meet criteria detailed in ASTM D3740 and ASTM E329.
- 2. Capability Recheck: If the selected laboratory fails the capability check, the Contractor will be assessed a charge equal to value of recheck to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the Contract amount due the Contractor.
- C. Onsite Laboratory: VA reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

- A. Punch-Out Inspection: Conduct an inspection of the work by the CQC system Manager near the end of the work, or any increment of the work established by a time stated FAR 52.211-10 - Commencement, Prosecution, and Completion of Work, or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff 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.
- B. Pre-Final Inspection: The Government will perform the Pre-Final Inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final Acceptance Inspection with the customer can be scheduled. Correct any items noted on the Pre-Final Inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need to be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate construction completion dates.
- C. Final Acceptance Inspection: The Contractor's QC Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Authorized designee is required to be in attendance at the Final Acceptance Inspection. Additional Government personnel can also be in attendance. The Final Acceptance Inspection will be formally scheduled by the Contracting Officer's or Authorized designee based upon results

of the Pre-Final Inspection. Notify the Contracting Officer through the COR at least 14 days prior to the Final Acceptance Inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date schedule for the Final Acceptance Inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with FAR Clause 52.246-12 titled "Inspection of Construction".

3.9 DOCUMENTATION

- A. Quality Control Activities: Maintain current records providing factual evidence that required QC activities and tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:
1. The name and area of responsibility of the Contractor/Subcontractor
 2. Operating plant/equipment with hours worked, idle, or down for repair.
 3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
 4. Test and control activities performed with results and references to specification/drawing requirements. Identify the Control Phase (Preparatory, Initial, and/or Follow-Up). List deficiencies noted, along with corrective action.
 5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specification/drawing requirements.
 6. Submittals and deliverables reviewed, with Contract reference, by whom, and action taken.
 7. Offsite surveillance activities, including actions taken.
 8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
 9. Instructions given/received and conflicts in plans and specifications.
 10. Provide documentation of design quality control activities.

- B. Verification Statement: Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Furnish the original and one copy of these records in report form to the Government daily with 1 week after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit on report for every 7 days of no work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate QC personnel within the CQC System Manager Report.

3.10 SAMPLE FORMS

- A. Templates of various quality control reports can be found on the Whole Building Design Guide website at https://www.wbdg.org/FFC/NAVGRAPH/quality_control_reports.pdf

3.11 NOTIFICATION OF NONCOMPLIANCE:

- A. The Contracting Officer or Authorized designee will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor should take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer can 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 or for excess costs or damages by the Contractor.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

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 by the General Contractor.

1.2 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 the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
1. T27-11 Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
 2. T96-02 (R2006) Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 3. T104-99 (R2007) Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
 4. T180-10 Standard Method of Test for Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
 5. T191-02 (R2006) Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method
 6. T205 Standard Method of Test for Density of Soil In-Place by the Rubber-Balloon Method
 7. T230 Standard Method of Test for Determining Degree of Pavement Compaction of Bituminous Aggregate Mixtures
 8. T310-13 Standard Method of Test for In-place Density and Moisture Content of Soil and Soil-aggregate by Nuclear Methods (Shallow Depth)
- C. American Society for Testing and Materials (ASTM):
1. A370-12 Standard Test Methods and Definitions for Mechanical Testing of Steel Products
 2. A416/A416M-10 Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete

3. A880 Standard Practice for Criteria for Use in Evaluation of Testing Laboratories and Organizations for Examination and Inspection of Steel, Stainless Steel, and Related Alloys
4. C31/C31M-10 Standard Practice for Making and Curing Concrete Test Specimens in the Field
5. C33/C33M-11a Standard Specification for Concrete Aggregates
6. C39/C39M-12 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
7. C109/C109M-11b Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
8. C136-06 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
9. C138/C138M-10b Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
10. C140-12 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
11. C143/C143M-10a Standard Test Method for Slump of Hydraulic Cement Concrete
12. C172/C172M-10 Standard Practice for Sampling Freshly Mixed Concrete
13. C173/C173M-10b Standard Test Method for Air Content of freshly Mixed Concrete by the Volumetric Method
14. C330/C330M-09 Standard Specification for Lightweight Aggregates for Structural Concrete
15. C567/C567M-11 Standard Test Method for Density Structural Lightweight Concrete
16. C780-11 Standard Test Method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
17. C1019-11 Standard Test Method for Sampling and Testing Grout
18. C1064/C1064M-11 Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
19. C1077-11c Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
20. C1314-11a Standard Test Method for Compressive Strength of Masonry Prisms

21. D422-63(2007) Standard Test Method for Particle-Size Analysis of Soils
22. D698-07e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
23. D1140-00(2006) Standard Test Methods for Amount of Material in Soils Finer than No. 200 Sieve
24. D1143/D1143M-07e1 Standard Test Methods for Deep Foundations Under Static Axial Compressive Load
25. D1188-07e1 Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
26. D1556-07 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
27. D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft lbf/ft³ (2,700 KNm/m³))
28. D2166-06 Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
29. D2167-08) Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
30. D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
31. D2974-07a Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
32. D3666-11 Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
33. D3740-11 Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction
34. D6938-10 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
35. E94-04(2010) Standard Guide for Radiographic Examination
36. E164-08 Standard Practice for Contact Ultrasonic Testing of Weldments
37. E329-11c Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
38. E543-09 Standard Specification for Agencies Performing Non-Destructive Testing

- 39. E605-93(R2011) Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members
- 40. E709-08 Standard Guide for Magnetic Particle Examination
- 41. E1155-96(R2008) Determining FF Floor Flatness and FL Floor Levelness Numbers
- 42. F3125/F3125M-15 Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions

D. American Welding Society (AWS):

- 1. D1.D1.1M-10 Structural Welding Code-Steel

1.3 REQUIREMENTS:

- A. 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 (i.e.; E329, C1077, D3666, D3740, A880, E543) 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."
- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by COR. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of COR to such failure.
- C. Written Reports: Testing laboratory shall submit test reports to COR and Contractor, unless other arrangements are agreed to in writing by the COR. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to COR immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

- A. General: The Testing Laboratory shall 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 shall be as identified herein and shall include 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 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 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 part 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.
- B. Testing Compaction:
1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with ASTM D698 and ASTM D1557.
 2. Make field density tests in accordance with the primary testing method following ASTM D6938 wherever possible. Field density tests utilizing ASTM D1556 or ASTM D2167 shall 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 should provide satisfactory explanation to the COR before the tests are conducted.
- C. Fill and Backfill Material Gradation: One test per 20 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C136, ASTM D422, and ASTM D1140.
- D. Testing for Footing Bearing Capacity: Evaluate if suitable bearing capacity material is encountered in footing subgrade.

- E. Testing Materials: Test suitability of on-site and off-site borrow as directed by COR. See MASS Specification for additional requirements.

3.2 ASPHALT CONCRETE PAVING:

A. Aggregate Base Course:

1. Determine maximum density and optimum moisture content for aggregate base material in accordance with ASTM D1557, Method D.
2. Make a minimum of three field density tests on each day's final compaction on each aggregate course in accordance with ASTM D1556.
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.
 - a. Asphalt temperature shall be 200-290 degrees Fahrenheit.
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.

3.3 SITE WORK CONCRETE:

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

3.4 CONCRETE:

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of COR with concurrence of Contracting Officer and perform periodic inspections thereafter as determined by COR.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to 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 each 40 m3 (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type.
 - a. After good concrete quality control has been established and maintained as determined by 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.
 - b. Label each cylinder with an identification number. 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 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 COR. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
- 2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
- 3. Furnish certified compression test reports (duplicate) to 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/m³ (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.

3.5 REINFORCEMENT:

- A. Review mill test reports furnished by Contractor.
- B. Perform sampling at fabricating plant. Take two samples from each 23 t (25 tons) or fraction thereof of each size of reinforcing steel No. 10 thru No. 57 (No. 3 thru No. 18).
 1. Make one tensile and one bend test in accordance with ASTM A370 from each pair of samples obtained.
 2. Written report shall include, in addition to test results, heat number, manufacturer, type and grade of steel, and bar size.
 3. Perform tension tests of mechanical and welded splices in accordance with ASTM A370.

3.6 STRUCTURAL STEEL:

- A. General: Provide shop and field inspection and testing services to certify structural steel work is done in accordance with contract documents. Welding shall conform to AWS D1.1 Structural Welding Code.
- 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 either 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 correction of rejected welds 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 F3125 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 F3125 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 F3125 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 COR.

3.7 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 COR.

3.8 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 COR.

3.9 TYPE OF TEST:

- A. Approximate Number of Tests Required:
 - 1. Earthwork:
 - a. Laboratory Compaction Test, Soils (ASTM D1557): 5
 - b. Field Density, Soils (AASHTO T191, AASHTO T205, or AASHTO T310): 5
 - c. Penetration Test, Soils: 5
 - 2. Aggregate Base:
 - a. Laboratory Compaction, (AASHTO T180): 5
 - b. Field Density (AASHTO T191): 5
 - c. Aggregate, Base Course Gradation (AASHTO T27): 5
 - d. Wear (AASHTO T96): 5
 - e. Soundness (AASHTO T104): 5
 - 3. Asphalt Concrete:
 - a. Field Density (AASHTO T230): 5
 - b. Aggregate, Asphalt Concrete Gradation (AASHTO T27): 5
 - c. Wear (AASHTO T96): 5
 - d. Soundness (AASHTO T104): 5
 - 4. Concrete:
 - a. Making and Curing Concrete Test Cylinders (ASTM C31): 5 per truck
 - b. Compressive Strength, Test Cylinders (ASTM C39): 5 per truck (7-day, 28-day, 56-day)

- c. Concrete Slump Test (ASTM C143): 1 per truck
 - d. Concrete Air Content Test (ASTM C173): 1 per truck
 - e. Unit Weight, Lightweight Concrete (ASTM C567): _____
 - f. Aggregate, Normal Weight: Gradation (ASTM C33):

 - g. Deleterious Substances (ASTM C33): _____
 - h. Soundness (ASTM C33): _____
 - i. Abrasion (ASTM C33): _____
 - j. Aggregate, Lightweight Gradation (ASTM C330): _____
 - k. Deleterious Substances (ASTM C330): _____
 - l. Unit Weight (ASTM C330): _____
 - m. Flatness and Levelness Readings (ASTM E1155): _____
days
5. Reinforcing Steel:
- a. Tensile Test (ASTM A370): _____
 - b. Bend Test (ASTM A370): _____
 - c. Mechanical Splice (ASTM A370): _____
 - d. Welded Splice Test (ASTM A370): _____
6. Structural Steel:
- a. Ultrasonic Testing of Welds (ASTM E164): _____
 - b. Magnetic Particle Testing of Welds (ASTM E709):

 - c. Radiographic Testing of Welds (ASTM E94): _____
7. Sprayed-On Fireproofing:
- a. Thickness and Density Tests (ASTM E605): _____

3.10 TESTING LABORATORY EQUIPMENT

- A. Testing laboratory will be equipped with:
- 1. Concrete cylinder storage facilities.
 - 2. Compression machine.
 - 3. Cube molds.
 - 4. Proctor molds.

5. Balances.
6. Scales.
7. Moisture ovens.
8. Slump cones.
9. Air meter.
10. All necessary equipment for compaction control.
11. All necessary equipment for air monitoring.
12. All necessary equipment for hazardous material testing.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 INFORMATIONAL SUBMITTALS

- A. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- B. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. Locations of dust-control portable containment cart during each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Other dust-control measures.
- C. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
 - 1. Methods used to meet the goals and requirements of the Owner.
 - 2. Location of construction devices on the site.
 - 3. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
 - 4. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
 - 5. Indicate locations of sensitive research, patient, and equipment areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **NOTE: General contractor shall purchase (1) government approved portable containment cart for use on the project. Upon final acceptance of the project work, the portable containment cart and accessories is to be turned over to the government. The COR will provide the room delivery location at the end of the project/use.**
- B. General contractor shall coordinate in advance with the VA Project Engineer (COTR) regarding all above ceiling work in public corridors, offices, general public occupied spaces, etc. All work within interior spaces, particularly "active" patient care areas including public corridors in patient care areas, the contractor shall utilize a portable containment cart with a certified self-contained 99.99% HEPA filtered negative air machine. The intent is to coordinate ceiling cable pull/stringing work with the VA during low activity hours (low/non/vacated patient and staff use). In the scenario where ceiling access is needed when patients and staff cannot be relocated, portable HEPA containment carts may be required for safety. This requirement is for ALL work outside the negative air pressurized construction partitioned area.
- C. General contractor shall coordinate in advance with the VA Project Engineer (COTR) regarding pulling all cabling/wiring/fiber above ceilings with all interior spaces, particularly patient care buildings including public corridors in patient care buildings, the contractor shall utilize Cabling Access Point (CAP) in the ceiling to feed cable cleanly with minimal impact. This shall be installed within the portable

containment carts then cabling/wiring/fiber can be pulled via Cabling Access Point (CAP). Removal of the Cabling Access Point (CAP) shall be performed using the portable containment carts.

- D. Portable Containment Carts: A portable enclosure with self-contained HEPA filtered negative air machine for work in sterile and/or patient environment outside of the Containment Area.
- E. Basis of design: One (1) HEPACART Inc. HC Series. (Brand Name: similar to HEPACART® 55-- Crew Capacity (1+) MOBILE CEILING ACCESS CART FOR CONTAINMENT AND FILTRATION, **quantity (1) product code HC55U18.ETL.**

1. Construction:

- a. One person, end entry ceiling access cart for smaller areas with 15 convenience and safety options included. Unit is ETL listed for Canada and the United States.
- b. Working Dimensions: Collapsed: 29"W x 55"L x 68"T. Fits through any 3.0 door. Extended: Reaches up to 10'6" with standard enclosure and up to 14' with additional options.
- c. Structure: Fully boxed aluminum frame with caster and wheel assembly rated for 900 lbs. each. Total cart rated for 1500+ lbs. All four casters are non-marring, self-braking. Swivel
- d. locks on one end. HEPA-Filtered Negative Air Machine: Lab-tested design, individually tested units and wither certified atesting results and documentation
- e. included. Medical grade 99.99+% at .03 microns. MERV 18 plus. Double gasketed. Fan rated at 750 CFM.

2. Electrical:

- a. Three-way electrical wired for 120 v. allows power to be safely controlled inside and outside the cart for best IC practices. Includes 25 ft. retractable extension cord, convenience outlets and lighting. Negative Air Machine:

3. Features:

- a. Most Versatile Raise/LowerMechanism: Telescoping, spring-loaded extension poles (for a tight seal) raise the enclosure to 10'6" standard Raises up to 14' with additional option tall enclosure and MTA (multiple tile adapter. Moves in 90 seconds or less with no tools.
- b. Adjustable Enclosure: Fabricated using a durable, healthcare approved, antimicrobial, anti-static, re-resistant and easy to clean material -- available in white (standard).
- c. Each enclosure has: Two pass-thru slips, Clear zipping closed-top. Slide-out / offset top-frame to work around wall obstacles like handrails.
- d. Interior Lighting: LED lighting package includes: The HALO lighting in the enclosure which lights the work-area including the space above ceiling, LED shelf light LED in-use light.
- e. Premium End-Entry Door with: Lock and key set Window and Work order/permit slid holder.
- f. Safety Features: Negative air indicator (manometer) Walk-off mat storage compartment below the door.

4. Required Accessories:

- a. HEPACART® Negative Air Machine Testing and Certification HEPA, **quantity (1) product code CERT.**
- b. HEPACART® Vinyl/Dust Top Cover HC74U Series Keeps dust out of cart while in storage, **quantity (1) product code DCHC74U.**
- c. HEPACART® 55 Multiple Tile Adapter (Fits HALO) HEPACART® Halo Top Frame Version of the Multiple Tile Adaptor for HC55 Models, **quantity (1) product code MTA55HALO.**
- d. HEPACART® Adjustable Ladder Extension Module Telescoping ladder extension module allows longer shelf and extension ladders to be used within the HEPACART® or DUSTBUGGY® with a working height 15 feet plus. Module stores, **quantity (1) product code ALEM55.**
- e. HEPACART® Wall Access Enclosure with Vision Panels HC55U Series Add Wall Access Enclosure and two windows for HC55U series HEPACART®. Window in enclosure folds down to access walls above 72 in, **quantity (1) product code WAE55U18.**
- f. HEPACART® Replacement Pre-Filters, quantity two (3) product code PF24241.
- g. HEPACART® Clean Mats with Cardboard backing, **quantity (1) product code CM.**

2.2 EQUIPMENT

- A. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of

- temporary partition construction, and continuing until removal of temporary partitions is complete.
2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

END OF SECTION 015000

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

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, solid waste, radiant energy, and radioactive materials, 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. Effect other species of importance to humankind, or;
 - 4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- C. Definitions of Pollutants:
 - 1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
 - 2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
 - 3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
 - 4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
 - 5. 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 "water of the United States" and would require a permit to discharge water from the governing agency.

6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
7. Sanitary Wastes:
 - a. Sewage: Domestic sanitary sewage and human and animal waste.
 - b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2 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, and ordinances. Note any corrective action taken.

1.3 REFERENCES

- 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. U.S. National Archives and Records Administration (NARA):
 1. 33 CFR 328 Definitions

1.4 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
 1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the 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, the Contractor shall prepare and submit to the COR for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
 - a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
 - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
 - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.

- d. Description of the Contractor's environmental protection personnel training program.
 - e. 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.
 - f. 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.
 - g. Procedures to provide the environmental protection that comply 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.
 - h. Permits, licenses, and the location of the solid waste disposal area.
 - i. Environmental Monitoring Plans for the job site including land, water, air, and noise.
 - j. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
- B. 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.

1.5 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. Confine activities to areas defined by 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, and land forms without permission from the COR. Do not fasten or attach ropes, cables,

or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
 2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features to be preserved by marking, fencing, or using any other approved techniques.
 - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
 - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
 - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
 3. 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.
 4. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 5. Handle discarded materials other than those included in the solid waste category as directed by the 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. Monitor water areas affected by construction.
- D. 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 Michigan 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. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
 3. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- E. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the 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 8:00 a.m and 6:00 p.m. unless otherwise permitted by local ordinance or the COR. Repetitive impact noise on the property shall not exceed the following dB limitations:

<u>Time Duration of Impact Noise</u>	<u>Sound Level in dB</u>
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 at 15 m (50 feet) (dBA):
 - 1) Materials Handling
 - (a) Concrete Mixers 75
 - (b) Concrete Pumps 75
 - (c) Cranes 75
 - (d) Jack Hammers 75

- | | |
|---------------------|----|
| (e) Rock Drills | 80 |
| (f) Pneumatic Tools | 80 |
| (g) Saws | 75 |
| (h) Vibrators | 75 |
| (i) Trucks | 75 |
| 2) Miscellaneous | |
| (a) Pumps | 75 |
| (b) Generators | 75 |
| (c) Compressors | 75 |
- b. Use shields or other physical barriers to restrict noise transmission.
- c. Provide soundproof housings or enclosures for noise-producing machinery.
- d. Use efficient silencers on equipment air intakes.
- e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
- f. Line hoppers and storage bins with sound deadening material.
- g. 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 55 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 weighing network 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 COR noting any problems and the alternatives for mitigating actions.
- F. 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.

- G. 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 satisfactory to the COR. Cleaning shall include off the station 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.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

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, copper, 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.

14. Fluorescent lamps.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 02 41 00, VA DEMOLITION.

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 recycle construction and demolition waste to greatest extent feasible.

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 COR 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 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.

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.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 01 81 11
SUSTAINABLE CONSTRUCTION REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. This section describes general requirements and procedures to comply with the Guiding Principles for Leadership in High Performance and Sustainable Buildings Memorandum of Understanding incorporated in the Executive Orders 13423 and 13514; Energy Policy Act of 2005 (EPA 2005) and the Energy Independence and Security Act of 2007 (EISA 2007).

1.2 OBJECTIVES

- A. To maximize resource efficiency and reduce the environmental impacts of construction and operation, the Contractor during the construction phase of this project shall implement the following procedures:
1. Select products that minimize consumption of energy, water and non-renewable resources, while minimizing the amounts of pollution resulting from the production and employment of building technologies. It is the intent of this project to conform to EPA's Five Guiding Principles on environmentally preferable purchasing. The five principles are:
 - a. Include environmental considerations as part of the normal purchasing process.
 - b. Emphasize pollution prevention early in the purchasing process.
 - c. Examine multiple environmental attributes throughout a product's or service's life cycle.
 - d. Compare relevant environmental impacts when selecting products and services.
 - e. Collect and base purchasing decisions on accurate and meaningful information about environmental performance.
 2. Control sources for potential Indoor Air Quality (IAQ) pollutants by controlled selection of materials and processes used in project construction in order to attain superior IAQ.
 3. Products and processes that achieve the above objectives to the extent currently possible and practical have been selected and included in these Construction Documents. The Contractor is responsible to maintain and support these objectives in developing means and methods for performing the work of this Contract and in

proposing product substitutions and/or changes to specified processes.

4. Use building practices that insure construction debris and particulates do not contaminate or enter existing duct work.

1.3 RELATED DOCUMENTS

- A. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT

1.4 DEFINITIONS

- A. Agrifiber Products: Composite panel products derived from agricultural fiber.
- B. Biobased Product: As defined in the 2002 Farm Bill, a product determined by the Secretary to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials.
- C. Biobased Content: The weight of the biobased material divided by the total weight of the product and expressed as a percentage by weight.
- D. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products has been tracked through its extraction and fabrication to ensure that it was obtained from forests certified by a specified certification program.
- E. Composite Wood: A product consisting of wood fiber or other plant particles bonded together by a resin or binder.
- F. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations. A construction waste management plan is to be provided by the Contractor as defined in Section 01 74 19.
- G. Third Party Certification: Certification of levels of environmental achievement by nationally recognized sustainability rating system.
- H. Light Pollution: Light that extends beyond its source such that the additional light is wasted in an unwanted area or in an area where it inhibits view of the night sky.
- I. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock

- J. Post-Consumer Recycled Content: The percentage by weight of constituent materials that have been recovered or otherwise diverted from the solid-waste stream after consumer use.
- K. Pre-Consumer Recycled Content: Materials that have been recovered or otherwise diverted from the solid-waste stream during the manufacturing process. Pre-consumer content must be material that would not have otherwise entered the waste stream as per Section 5 of the FTC Act, Part 260 "Guidelines for the Use of Environmental Marketing Claims": www.ftc.gov/bcp/grnrule/guides980427.
- L. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 250 miles (400 km) from the Project site.
- M. Salvaged or Reused Materials: Materials extracted from existing buildings in order to be reused in other buildings without being manufactured.
- N. Sealant: Any material that fills and seals gaps between other materials.
- O. Type 1 Finishes: Materials and finishes which have a potential for short-term levels of off gassing from chemicals inherent in their manufacturing process, or which are applied in a form requiring vehicles or carriers for spreading which release a high level of particulate matter in the process of installation and/or curing.
- P. Type 2 Finishes: "Fuzzy" materials and finishes which are woven, fibrous, or porous in nature and tend to adsorb chemicals offgas
- Q. Volatile Organic Compounds (VOCs): Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Compounds that have negligible photochemical reactivity, listed in EPA 40 CFR 51.100(s), are also excluded from this regulatory definition.

1.5 SUBMITTALS

- A. Sustainable Construction Submittals:
 - 1. Appliances and Equipment: Provide copies of manufacturer's product data for all Energy Star eligible equipment and appliances, including video monitors verifying compliance with EPA's Energy Star program.

2. Recycled Content: Submittals for all materials with recycled content (excluding MEP systems equipment and components) must include the following documentation: Manufacturer's product data, product literature, or a letter from the manufacturer verifying the percentage of post-consumer and pre-consumer recycled content (by weight) of each material or product.
 3. Interior Adhesives and Sealants: Submittals for all field-applied adhesives and sealants, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content.
 - a. Provide manufacturers' documentation verifying all adhesives used to apply laminates, whether shop-applied or field-applied, contain no urea-formaldehyde.
 4. Interior Paints and Coatings: Submittals for all field-applied paints and coatings, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content.
 5. Floor Coverings:
 - a. Carpet Systems: Not applicable to this project.
 6. Composite Wood and Agrifiber Binders: Submittals for all composite wood and agrifiber products (including but not limited to particleboard, wheatboard, strawboard, agriboard products, engineered wood components, solid-core wood doors, OSB, MDF, and plywood products) must include manufacturer's product data verifying that these products contain no urea-formaldehyde resins.
 7. Systems Furniture and Seating: Not applicable to this project.
 8. Entryway Systems: Not applicable to this project.
 9. Mercury in Lighting: Provide manufacturer's cut sheets or product data for all fluorescent or HID lamps highlighting mercury content.
 10. Gypsum Wall Board: Provide manufacturer's cut sheets or product data verifying that all gypsum wallboard products are moisture and mold-resistant.
 11. Green Housekeeping: Provide documentation that all cleaning products and janitorial paper products meet the VOC limits and content requirements of this specification section.
- B. Construction Waste Management: See Section 01 74 19 "Construction Waste Management" for submittal requirements.

C. Construction Indoor Air Quality (IAQ) Management Plan (CIAQMP):

Submittals must include the following:

1. Not more than 30 days after the Preconstruction Meeting, prepare and submit for the COTR approval, an electronic copy of the draft Construction IAQ Management Plan in an electronic file including, but not limited to, descriptions of the following:
2. Instruction procedures for meeting or exceeding the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995, Chapter 3, including procedures for HVAC Protection, Source Control, Pathway Interruption, Housekeeping, and Scheduling.
 - a. Instruction procedures for protecting absorptive materials stored on-site or installed from moisture damage.
 - b. Schedule of submission to COR of photographs of on-site construction IAQ management measures such as protection of ducts.
 - c. Provide a description of filtration media to be used at each return air grille.
 - d. Instruction procedure for replacing all air-filtration media immediately prior to occupancy after completion of construction, including a description of filtration media to be used at each air handling or air supply unit.
3. Not more than 30 days following receipt of the approved draft CIAQMP, submit an electronic copy of the approved CIAQMP in an electronic file, along with the following:
 - a. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for all filtration media to be installed at return air grilles during construction if permanently installed AHUs are used during construction.
 - b. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for filtration media in all air handling units (AHUs).
4. Not more than 14 days after Substantial Completion provide the following:
 - a. Documentation verifying required replacement of air filtration media in all air handling units (AHUs) after the completion of

construction and prior to occupancy and, if applicable, required installation of filtration during construction.

- b. Minimum of 18 Construction photographs: Six photographs taken on three different occasions during construction of the SMACNA approaches employed, along with a brief description of each approach, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or
- D. Sustainable Construction Progress Reports: Concurrent with each Application for Payment, submit reports for the following:
 - 1. Construction Waste Management: Waste reduction progress reports and logs complying with the requirements of Section 01 74 19 "Construction Waste Management".
 - 2. Construction IAQ Management: See details below under Section 3.2 Construction Indoor Air Quality Management for Construction IAQ management progress report requirements.

1.6 QUALITY ASSURANCE

- A. Preconstruction Meeting: After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with COR and all Subcontractors to discuss the Construction Waste Management Plan, the required Construction Indoor Air Quality (IAQ) Management Plan, and all other Sustainable Construction Requirements. The purpose of this meeting is to develop a mutual understanding of the Project's Sustainable Construction Requirements and coordination of the Contractor's management of these requirements with the COR.
- B. Construction Job Conferences: The status of compliance with the Sustainable Construction Requirements of these specifications will be an agenda item at all regular job meetings conducted during the course of work at the site.

PART 2 - PRODUCTS

2.1 PRODUCT ENVIRONMENTAL REQUIREMENTS

- A. Do not burn rubbish, organic matter, etc. or any material on the site. Dispose of legally in accordance with Specifications Sections 01 74 19.
- B. Appliances and Equipment: All materials and equipment being installed that falls under the Energy Star or FEMP programs must be Energy Star or FEMP-rated. Eligible equipment includes video monitors.
- C. Recycled Content of Materials:

1. Provide building materials with recycled content such that post-consumer recycled content value plus half the pre-consumer recycled content value constitutes a minimum of 10% of the cost of materials used for the Project, exclusive of all MEP equipment, labor, and delivery costs. The Contractor shall make all attempts to maximize the procurement of materials with recycled content.
 - a. e post-consumer recycled content value of a material shall be determined by dividing the weight of post-consumer recycled content by the total weight of the material and multiplying by the cost of the material.
 - b. Do not include mechanical and electrical components in the calculations.
 - c. Do not include labor and delivery costs in the calculations.
 - d. Recycled content of materials shall be defined according to the Federal Trade Commission's "Guide for the Use of Environmental Marketing Claims," 16 CFR 260.7 (e).
 - e. Utilize all on-site existing paving materials that are scheduled for demolition as granulated fill, and include the cost of this material had it been purchased in the calculations for recycled content value.
 - f. The materials in the following list must contain the minimum recycled content indicated:

Category	Minimum Recycled Content
Steel Fabrications	60% combined
Steel Studs	30% combined
Aluminum Fabrications	35% combined

D. Biobased Content:

1. For products designated by the USDA's BioPreferred program, provide products that meet or exceed USDA recommendations for biobased content, so long as products meet all other performance requirements in VA master specifications. For more information regarding the product categories covered by the BioPreferred program, visit <http://www.biopreferred.gov>.

- - END - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 01 91 00
GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSIONING DESCRIPTION

- A. This Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS shall form the basis of the construction phase commissioning process and procedures. The Commissioning Agent shall add, modify, and refine the commissioning procedures, as approved by the Department of Veterans Affairs (VA), to suit field conditions and actual manufacturer's equipment, incorporate test data and procedure results, and provide detailed scheduling for all commissioning tasks.
- B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the Division 23 and Division 26 series sections of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor shall coordinate the work required by individual specification sections with the commissioning services requirements specified herein.
- C. Where individual testing, adjusting, or related services are required in the project specifications and not specifically required by this commissioning requirements specification, the specified services shall be provided and copies of documentation, as required by those specifications shall be submitted to the VA and the Commissioning Agent to be indexed for future reference.
- D. Where training or educational services for VA are required and specified in other sections of the specifications, including but not limited to Division 23 and Division 26 series sections of the specification, these services are intended to be provided in addition to the training and educational services specified herein.
- E. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the VA's operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:

1. Verify that the applicable equipment and systems are installed in accordance with the contact documents and according to the manufacturer's recommendations.
 2. Verify and document proper integrated performance of equipment and systems.
 3. Verify that Operations & Maintenance documentation is complete.
 4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
 5. Verify that the VA's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
 6. Document the successful achievement of the commissioning objectives listed above.
- F. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.
- G. The Contractor shall hire an individual, company or firm to act as the Commissioning Agent.

1.2 CONTRACTUAL RELATIONSHIPS

- A. For this construction project, the Department of Veterans Affairs contracts with a Contractor to provide construction services. The contracts are administered by the VA Contracting Officer and the COR as the designated representative of the Contracting Officer. On this project, the authority to modify the contract in any way is strictly limited to the authority of the Contracting Officer.
- B. In this project, only two contract parties are recognized and communications on contractual issues are strictly limited to VA COR and the Contractor. It is the practice of the VA to require that communications between other parties to the contracts (Subcontractors and Vendors) be conducted through the COR and Contractor. It is also the practice of the VA that communications between other parties of the project (Commissioning Agent and Architect/Engineer) be conducted through the COR.
- C. With these fundamental practices in mind, the commissioning process described herein has been developed to recognize that, in the execution of the Commissioning Process, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering

commissioned systems while simultaneously respecting the exclusive contract authority of the Contracting Officer and COR. Thus, the procedures outlined in this specification must be executed within the following limitations:

1. No communications (verbal or written) from the Commissioning Agent shall be deemed to constitute direction that modifies the terms of any contract between the Department of Veterans Affairs and the Contractor.
2. Commissioning Issues identified by the Commissioning Agent will be delivered to the COR and copied to the designated Commissioning Representatives for the Contractor and subcontractors on the Commissioning Team for information only in order to expedite the communication process. These issues must be understood as the professional opinion of the Commissioning Agent and as suggestions for resolution.
3. In the event that any Commissioning Issues and suggested resolutions are deemed by the COR to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or COR will issue an official directive to this effect.
4. All parties to the Commissioning Process shall be individually responsible for alerting the COR of any issues that they deem to constitute a potential contract change prior to acting on these issues.
5. Authority for resolution or modification of design and construction issues rests solely with the Contracting Officer or COR, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

1.3 RELATED WORK

- A. Section 01 00 00 GENERAL REQUIREMENTS.
- B. Section 01 33 23 VA SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- C. Section 22 08 00 COMMISSIONING OF PLUMBING SYSTEMS.
- D. Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC
- E. Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.
- F. Section 27 08 00 COMMISSIONING OF COMMUNICATIONS SYSTEMS.
- G. Section 28 08 00 COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS

1.4 SUMMARY

- A. This Section includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.

1.5 ACRONYMS

A. A/E	Architect/Engineer Design Team
B. AHJ	Authority Having Jurisdiction
C. ASHRAE	Association Society for Heating Air Conditioning and Refrigeration Engineers
D. BOD	Basis of Design
E. BSC	Building Systems Commissioning
F. CCTV	Closed Circuit Television
G. CD	Construction Documents
H. CMMS	Computerized Maintenance Management System
I. CO	Contracting Officer (VA)
J. COR	Contracting Officer's Representative
K. COBie	Construction Operations Building Information Exchange
L. CPC	Construction Phase Commissioning
M. Cx	Commissioning
N. CxA	Commissioning Agent
O. CxM	Commissioning Manager
P. CxR	Commissioning Representative
Q. DPC	Design Phase Commissioning
R. FPT	Functional Performance Test
S. HVAC	Heating, Ventilation, and Air Conditioning
T. NC	Department of Veterans Affairs National Cemetery
U. NCA	Department of Veterans Affairs National Cemetery Administration
V. NEBB	National Environmental Balancing Bureau
W. O&M	Operations & Maintenance
X. OPR	Owner's Project Requirements
Y. PFC	Pre-Functional Checklist

Z. PFT	Pre-Functional Test
AA.SD	Schematic Design
AB.TAB	Test Adjust and Balance
AC.VA	US Department of Veterans Affairs
AD.VAMC	VA Medical Center
AE.VA CFM	VA Office of Construction and Facilities Management
AF.VACO	VA Central Office
AG.VA PM	VA Project Manager
AH.VA RE	VA Resident Engineer

1.6 DEFINITIONS

- A. Accuracy: The capability of an instrument to indicate the true value of a measured quantity.
- B. Back Check: A back check is a verification that an agreed upon solution to a design comment has been adequately addressed in a subsequent design review
- C. Benchmarks: Benchmarks are the comparison of a building's energy usage to other similar buildings and to the building itself.. For example, ENERGY STAR Portfolio Manager is a frequently used and nationally recognized building energy benchmarking tool.
- D. Calibrate: The act of comparing an instrument of unknown accuracy with a standard of known accuracy to detect, correlate, report, or eliminate by adjustment any variation in the accuracy of the tested instrument.
- E. Commissionability: Defines a design component or construction process that has the necessary elements that will allow a system or component to be effectively measured, tested, operated and commissioned
- F. Commissioning Agent (CxA): The qualified Commissioning Professional who administers the Cx process by managing the Cx team and overseeing the Commissioning Process. Where CxA is used in this specification it means the Commissioning Agent, members of his staff or appointed members of the commissioning team. Note that LEED uses the term Commissioning Authority in lieu of Commissioning Agent.
- G. Commissioning Checklists: Lists of data or inspections to be verified to ensure proper system or component installation, operation, and function. Verification checklists are developed and used during all phases of the commissioning process to

verify that the Owner's Project Requirements (OPR) is being achieved.

- H. Commissioning Issue: A condition identified by the Commissioning Agent or other member of the Commissioning Team that adversely affects the commissionability, operability, maintainability, or functionality of a system, equipment, or component. A condition that is in conflict with the Contract Documents and/or performance requirements of the installed systems and components. (See also - Commissioning Observation).
- I. Commissioning Manager (CxM): A qualified individual appointed by the Contractor to manage the commissioning process on behalf of the Contractor.
- J. Commissioning Observation: An issue identified by the Commissioning Agent or other member of the Commissioning Team that does not conform to the project OPR, contract documents or standard industry best practices. (See also Commissioning Issue)
- K. Commissioning Plan: A document that outlines the commissioning process, commissioning scope and defines responsibilities, processes, schedules, and the documentation requirements of the Commissioning Process.
- L. Commissioning Process: A quality focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems, components, and assemblies are planned, designed, installed, tested, can be operated, and maintained to meet the Owner's Project Requirements.
- M. Commissioning Report: The final commissioning document which presents the commissioning process results for the project. Cx reports include an executive summary, the commissioning plan, issue log, correspondence, and all appropriate check sheets and test forms.
- N. Commissioning Representative (CxR): An individual appointed by a sub-contractor to manage the commissioning process on behalf of the sub-contractor.
- O. Commissioning Specifications: The contract documents that detail the objective, scope and implementation of the commissioning process as developed in the Commissioning Plan.
- P. Commissioning Team: Individual team members whose coordinated actions are responsible for implementing the Commissioning Process.
- Q. Construction Phase Commissioning: All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

- R. Contract Documents (CD): Contract documents include design and construction contracts, price agreements and procedure agreements. Contract Documents also include all final and complete drawings, specifications and all applicable contract modifications or supplements.
- S. Construction Phase Commissioning (CPC): All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.
- T. Coordination Drawings: Drawings showing the work of all trades that are used to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances. On mechanical projects, coordination drawings include structural steel, ductwork, major piping and electrical conduit and show the elevations and locations of the above components.
- U. Data Logging: The monitoring and recording of temperature, flow, current, status, pressure, etc. of equipment using stand-alone data recorders.
- V. Deferred System Test: Tests that cannot be completed at the end of the acceptance phase due to ambient conditions, schedule issues or other conditions preventing testing during the normal acceptance testing period.
- W. Deficiency: See "Commissioning Issue".
- X. Design Criteria: A listing of the VA Design Criteria outlining the project design requirements, including its source. These are used during the design process to show the design elements meet the OPR.
- Y. Design Intent: The overall term that includes the OPR and the BOD. It is a detailed explanation of the ideas, concepts, and criteria that are defined by the owner to be important. The design intent documents are utilized to provide a written record of these ideas, concepts and criteria.
- Z. Design Narrative: A written description of the proposed design solutions that satisfy the requirements of the OPR.
- AA. Design Phase Commissioning (DPC): All commissioning tasks executed during the design phase of the project.
- AB. Environmental Systems: Systems that use a combination of mechanical equipment, airflow, water flow and electrical energy to provide heating, ventilating, air conditioning, humidification, and dehumidification for the purpose of human comfort or process control of temperature and humidity.

- AC.Executive Summary: A section of the Commissioning report that reviews the general outcome of the project. It also includes any unresolved issues, recommendations for the resolution of unresolved issues and all deferred testing requirements.
- AD.Functionality: This defines a design component or construction process which will allow a system or component to operate or be constructed in a manner that will produce the required outcome of the OPR.
- AE.Functional Test Procedure (FTP): A written protocol that defines methods, steps, personnel, and acceptance criteria for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.
- AF.Industry Accepted Best Practice: A design component or construction process that has achieved industry consensus for quality performance and functionality. Refer to the current edition of the NEBB Design Phase Commissioning Handbook for examples.
- AG.Installation Verification: Observations or inspections that confirm the system or component has been installed in accordance with the contract documents and to industry accepted best practices.
- AH.Integrated System Testing: Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.
- AI.Issues Log: A formal and ongoing record of problems or concerns - and their resolution - that have been raised by members of the Commissioning Team during the course of the Commissioning Process.
- AJ.Maintainability: A design component or construction process that will allow a system or component to be effectively maintained. This includes adequate room for access to adjust and repair the equipment. Maintainability also includes components that have readily obtainable repair parts or service.
- AK.Manual Test: Testing using hand-held instruments, immediate control system readouts or direct observation to verify

performance (contrasted to analyzing monitored data taken over time to make the 'observation').

- AL.Precision: The ability of an instrument to produce repeatable readings of the same quantity under the same conditions. The precision of an instrument refers to its ability to produce a tightly grouped set of values around the mean value of the measured quantity.
- AM.Pre-Functional Checklist (PFC): A form used by the contractor to verify that appropriate components are onsite, correctly installed, set up, calibrated, functional and ready for functional testing.
- AN.Pre-Functional Test (PFT): An inspection or test that is done before functional testing. PFT's include installation verification and system and component start up tests.
- AO.Procedure or Protocol: A defined approach that outlines the execution of a sequence of work or operations. Procedures are used to produce repeatable and defined results.
- AP.Range: The upper and lower limits of an instrument's ability to measure the value of a quantity for which the instrument is calibrated.
- AQ.Resolution: This word has two meanings in the Cx Process. The first refers to the smallest change in a measured variable that an instrument can detect. The second refers to the implementation of actions that correct a tested or observed deficiency.
- AR.Site Observation Visit: On-site inspections and observations made by the Commissioning Agent for the purpose of verifying component, equipment, and system installation, to observe contractor testing, equipment start-up procedures, or other purposes.
- AS.Site Observation Reports (SO): Reports of site inspections and observations made by the Commissioning Agent. Observation reports are intended to provide early indication of an installation issue which will need correction or analysis.
- AT.Static Tests: Tests or inspections that validate a specified static condition such as pressure testing. Static tests may be specification or code initiated.
- AU.Start Up Tests: Tests that validate the component or system is ready for automatic operation in accordance with the manufactures requirements.
- AV.Systems Manual: A system-focused composite document that includes all information required for the owners operators to operate the systems.

- AW. Test Procedure: A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.
- AX. Testing: The use of specialized and calibrated instruments to measure parameters such as: temperature, pressure, vapor flow, air flow, fluid flow, rotational speed, electrical characteristics, velocity, and other data in order to determine performance, operation, or function.
- AY. Testing, Adjusting, and Balancing (TAB): A systematic process or service applied to heating, ventilating and air-conditioning (HVAC) systems and other environmental systems to achieve and document air and hydronic flow rates. The standards and procedures for providing these services are referred to as "Testing, Adjusting, and Balancing" and are described in the Procedural Standards for the Testing, Adjusting and Balancing of Environmental Systems, published by NEBB or AABC.
- AZ. Training Plan: A written document that details, in outline form the expectations of the operator training. Training agendas should include instruction on how to obtain service, operate, startup, shutdown and maintain all systems and components of the project.
- BA. Trending: Monitoring over a period of time with the building automation system.
- BB. Unresolved Commissioning Issue: Any Commissioning Issue that, at the time that the Final Report or the Amended Final Report is issued that has not been either resolved by the construction team or accepted by the VA. Validation: The process by which work is verified as complete and operating correctly:
1. First party validation occurs when a firm or individual verifying the task is the same firm or individual performing the task.
 2. Second party validation occurs when the firm or individual verifying the task is under the control of the firm performing the task or has other possibilities of financial conflicts of interest in the resolution (Architects, Designers, General Contractors and Third Tier Subcontractors or Vendors).
 3. Third party validation occurs when the firm verifying the task is not associated with or under control of the firm performing or designing the task.
- BC. Verification: The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

BD.Warranty Visit: A commissioning meeting and site review where all outstanding warranty issues and deferred testing is reviewed and discussed.

1.7 SYSTEMS TO BE COMMISSIONED

A. Commissioning of a system or systems specified for this project is part of the construction process. Documentation and testing of these systems, as well as training of the VA's Operation and Maintenance personnel, is required in cooperation with the VA and the Commissioning Agent.

B. The following systems will be commissioned as part of this project:

1. HVAC

- a. Direct Digital Control System - Operator work stations (including graphics, point mapping, trends, alarms, etc.), Network communications modules and wiring, Integration panels, control operators (damper actuators, valve actuators, etc.), and sensors.
- b. Decentralized Unitary HVAC Systems - Split system HVAC systems and Packaged Energy Recovery Ventilators.
- c. Also refer to Section 23 08 00, COMMISSIONING OF HVAC SECTIONS.

2. Electrical

- a. Grounding & Bonding Systems - Witness 3rd party testing, review reports.
- b. Low-Voltage Distribution Systems - Normal power distribution systems, Panelboards, and Verify breaker testing results (injection current, etc.).
- c. Also refer to Section 26 08 00, COMMISSIONING OF ELECTRICAL SYSTEMS.

3. Communication Systems

To be submitted with 65% submittal.

3. Integrated Systems Tests

- a. Loss of Power Response - Loss of power to building, loss of power to campus, restoration of power to building, restoration of power to campus.

1.8 COMMISSIONING TEAM

A. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project Superintendent and subcontractors, installers, schedulers, suppliers, and

specialists deemed appropriate by the Department of Veterans Affairs (VA) and Commissioning Agent.

B. Members Appointed by Contractor:

1. Commissioning Agent: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process.
2. Contractor' Commissioning Manager: The designated person, company, or entity that plans, schedules and coordinates the commissioning activities for the construction team.
3. Contractor's Commissioning Representative(s): Individual(s), each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions.

C. Members Appointed by VA:

1. User: Representatives of the facility user and operation and maintenance personnel.
2. A/E: Representative of the Architect and Engineering design professionals - GDM of Oregon(GDM).

1.9 VA'S COMMISSIONING RESPONSIBILITIES

A. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:

1. Coordination meetings.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Testing meetings.
4. Witness and assist in Systems Functional Performance Testing.
5. Demonstration of operation of systems, subsystems, and equipment.

B. Provide the Construction Documents, prepared by A/E and approved by VA, to the Commissioning Agent and for use in managing the commissioning process, developing the commissioning plan, systems manuals, and reviewing the operation and maintenance training plan.

1.10 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

A. The Contractor shall hire an individual, company or firm to act as the Commissioning Agent.

- B. The Contractor shall assign a Commissioning Manager to manage commissioning activities of the Contractor, and subcontractors.
- C. The Contractor shall ensure that the commissioning responsibilities outlined in these specifications are included in all subcontracts and that subcontractors comply with the requirements of these specifications.
- D. The Contractor shall ensure that each installing subcontractor shall assign representatives with expertise and authority to act on behalf of the subcontractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
 - 1. Participate in commissioning coordination meetings.
 - 2. Conduct operation and maintenance training sessions in accordance with approved training plans.
 - 3. Verify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
 - 4. Evaluate commissioning issues and commissioning observations identified in the Commissioning Issues Log, field reports, test reports or other commissioning documents. In collaboration with entity responsible for system and equipment installation, recommend corrective action.
 - 5. Review and comment on commissioning documentation.
 - 6. Participate in meetings to coordinate Systems Functional Performance Testing.
 - 7. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to Commissioning Agent for incorporation into the commissioning plan.
 - 8. Provide information to the Commissioning Agent for developing commissioning plan.
 - 9. Participate in training sessions for VA's operation and maintenance personnel.
 - 10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures to conduct Systems Functional Performance Testing of installed systems.

1.11 COMMISSIONING AGENT'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Prepare the commissioning plan.

- C. Review and comment on selected submittals from the Contractor for general conformance with the Construction Documents. Review and comment on the ability to test and operate the system and/or equipment, including providing gages, controls and other components required to operate, maintain, and test the system. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the Construction Documents.
- D. At the beginning of the construction phase, conduct an initial construction phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals, operation and maintenance training sessions, Pre-Functional Checklists, Systems Functional Performance Testing, and project completion.
- E. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss status of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The Commissioning Agent shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.
- F. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.
- G. Coordinate Systems Functional Performance Testing schedule with the Contractor.
- H. Witness selected systems startups.
- I. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.
- J. Witness and document Systems Functional Performance Testing.
- K. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
- L. Review and comment on operation and maintenance (O&M) documentation and systems manual outline for compliance with the Contract Documents. Operation and maintenance documentation requirements are specified in Paragraph 1.25, Section 01 00 00, GENERAL REQUIREMENTS.
- M. Prepare commissioning Field Observation Reports.
- N. Prepare the Final Commissioning Report.
- O. Assemble the final commissioning documentation, including the Final Commissioning Report and Addendum to the Final Commissioning Report.

1.12 COMMISSIONING DOCUMENTATION

- A. Commissioning Plan: A document, prepared by Commissioning Agent, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited, to the following:
1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
 2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
 3. Identification of systems and equipment to be commissioned.
 4. Schedule of Commissioning Coordination meetings.
 5. Identification of items that must be completed before the next operation can proceed.
 6. Description of responsibilities of commissioning team members.
 7. Description of observations to be made.
 8. Description of requirements for operation and maintenance training.
 9. Schedule for commissioning activities with dates coordinated with overall construction schedule.
 10. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
 11. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
 12. Preliminary Systems Functional Performance Test procedures.
- B. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for each system to be commissioned, including subsystems, or equipment and interfaces or interlocks with other systems. Systems Functional Performance Test Procedures will include a separate entry, with space for comments, for each item to be tested. Preliminary Systems Functional Performance Test Procedures will be provided to the VA, Architect/Engineer, and

Contractor for review and comment. The Systems Performance Test Procedure will include test procedures for each mode of operation and provide space to indicate whether the mode under test responded as required. Each System Functional Performance Test procedure, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:

1. Name and identification code of tested system.
 2. Test number.
 3. Time and date of test.
 4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
 5. Dated signatures of the person performing test and of the witness, if applicable.
 6. Individuals present for test.
 7. Observations and Issues.
 8. Issue number, if any, generated as the result of test.
- C. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent will spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.
- D. Test and Inspection Reports: The Commissioning Agent will record test data, observations, and measurements on Systems Functional Performance Test Procedure. The report will also include recommendation for system acceptance or non-acceptance. Photographs, forms, and other means appropriate for the application shall be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.
- E. Corrective Action Documents: The Commissioning Agent will document corrective action taken for systems and equipment that fail tests. The documentation will include any required modifications to systems and equipment and/or revisions to test procedures, if any. The Commissioning Agent will witness and document any retesting of systems and/or equipment requiring corrective action and document retest results.

F. Commissioning Issues Log: The Commissioning Agent will prepare and maintain Commissioning Issues Log that describes Commissioning Issues and Commissioning Observations that are identified during the Commissioning process. These observations and issues include, but are not limited to, those that are at variance with the Contract Documents. The Commissioning Issues Log will identify and track issues as they are encountered, the party responsible for resolution, progress toward resolution, and document how the issue was resolved. The Master Commissioning Issues Log will also track the status of unresolved issues.

1. Creating an Commissioning Issues Log Entry:

- a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
- b. Assign a descriptive title for the issue.
- c. Identify date and time of the issue.
- d. Identify test number of test being performed at the time of the observation, if applicable, for cross reference.
- e. Identify system, subsystem, and equipment to which the issue applies.
- f. Identify location of system, subsystem, and equipment.
- g. Include information that may be helpful in diagnosing or evaluating the issue.
- h. Note recommended corrective action.
- i. Identify commissioning team member responsible for corrective action.
- j. Identify expected date of correction.
- k. Identify person that identified the issue.

2. Documenting Issue Resolution:

- a. Log date correction is completed or the issue is resolved.
- b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
- c. Identify changes to the Contract Documents that may require action.
- d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.

- e. Identify person(s) who corrected or resolved the issue.
 - f. Identify person(s) verifying the issue resolution.
- G. Final Commissioning Report: The Commissioning Agent will document results of the commissioning process, including unresolved issues, and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been properly installed and are performing according to the Contract Documents. This report will be used by the Department of Veterans Affairs when determining that systems will be accepted. This report will be used to evaluate systems, subsystems, and equipment and will serve as a future reference document during VA occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents and those that do not meet requirements of the Contract Documents. The commissioning report will include, but is not limited to, the following:
- 1. Lists and explanations of substitutions; compromises; variances with the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. Design Narrative documentation maintained by the Commissioning Agent.
 - 2. Commissioning plan.
 - 3. Pre-Functional Checklists completed by the Contractor, with annotation of the Commissioning Agent review and spot check.
 - 4. Systems Functional Performance Test Procedures, with annotation of test results and test completion.
 - 5. Commissioning Issues Log.
 - 6. Listing of deferred and off season test(s) not performed, including the schedule for their completion.

1.13 SUBMITTALS

- A. Preliminary Commissioning Plan Submittal: The Commissioning Agent has prepared a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan is included as an Appendix to this specification section. The Preliminary Commissioning Plan is provided for information only. It contains preliminary information about the following commissioning activities:
- 1. The Commissioning Team: A list of commissioning team members by organization.
 - 2. Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list also provides

preliminary information on systems/equipment submittals to be reviewed by the Commissioning Agent; preliminary information on Pre-Functional Checklists that are to be completed; preliminary information on Systems Performance Testing, including information on testing sample size (where authorized by the VA).

3. Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.
 4. Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.
 5. Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.
 6. Pre-Functional Checklists: Preliminary Pre-Functional Checklists for equipment, components, subsystems, and systems to be commissioned. These Preliminary Pre-Functional Checklists provide guidance on the level of detailed information the Contractor shall include on the final submission.
 7. Systems Functional Performance Test Procedures: Preliminary step-by-step System Functional Performance Test Procedures to be used during Systems Functional Performance Testing. These Preliminary Systems Functional Performance procedures provide information on the level of testing rigor, and the level of Contractor support required during performance of system's testing.
- B. Final Commissioning Plan Submittal: Based on the Final Construction Documents and the Contractor's project team, the Commissioning Agent will prepare the Final Commissioning Plan as described in this section. The Commissioning Agent will submit three hard copies and three sets of electronic files of Final Commissioning Plan. The Contractor shall review the Commissioning Plan and provide any comments to the VA. The Commissioning Agent will incorporate review comments into the Final Commissioning Plan as directed by the VA.
- C. Systems Functional Performance Test Procedure: The Commissioning Agent will submit preliminary Systems Functional Performance Test Procedures to the Contractor, and the VA for review and comment. The Contractor shall return review comments to the VA and the Commissioning Agent. The VA will also return review comments to the Commissioning Agent. The Commissioning Agent

will incorporate review comments into the Final Systems Functional Test Procedures to be used in Systems Functional Performance Testing.

- D. Pre-Functional Checklists: The Commissioning Agent will submit Pre-Functional Checklists to be completed by the Contractor.
- E. Test and Inspection Reports: The Commissioning Agent will submit test and inspection reports to the VA with copies to the Contractor and the Architect/Engineer.
- F. Corrective Action Documents: The Commissioning Agent will submit corrective action documents to the VA COR with copies to the Contractor and Architect.
- G. Preliminary Commissioning Report Submittal: The Commissioning Agent will submit three electronic copies of the preliminary commissioning report. One electronic copy, with review comments, will be returned to the Commissioning Agent for preparation of the final submittal.
- H. Final Commissioning Report Submittal: The Commissioning Agent will submit four sets of electronically formatted information of the final commissioning report to the VA. The final submittal will incorporate comments as directed by the VA.
- I. Data for Commissioning:
 - 1. The Commissioning Agent will request in writing from the Contractor specific information needed about each piece of commissioned equipment or system to fulfill requirements of the Commissioning Plan.

1.14 COMMISSIONING PROCESS

- A. The Commissioning Agent will be responsible for the overall management of the commissioning process as well as coordinating scheduling of commissioning tasks with the VA and the Contractor. As directed by the VA, the Contractor shall incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.
- B. Within 30 days of contract award, the Contractor shall designate a specific individual as the Commissioning Manager (CxM) to manage and lead the commissioning effort on behalf of the Contractor. The Commissioning Manager shall be the single point of contact and communications for all commissioning related services by the Contractor.
- C. Within 30 days of contract award, the Contractor shall ensure that each subcontractor designates specific individuals as Commissioning Representatives (CxR) to be responsible for commissioning related tasks. The Contractor shall ensure the

designated Commissioning Representatives participate in the commissioning process as team members providing commissioning testing services, equipment operation, adjustments, and corrections if necessary. The Contractor shall ensure that all Commissioning Representatives shall have sufficient authority to direct their respective staff to provide the services required, and to speak on behalf of their organizations in all commissioning related contractual matters.

1.15 QUALITY ASSURANCE

- A. Instructor Qualifications: Factory authorized service representatives shall be experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.
- B. Test Equipment Calibration: The Contractor shall comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

1.16 COORDINATION

- A. Management: The Commissioning Agent will coordinate the commissioning activities with the VA and Contractor. The Commissioning Agent will submit commissioning documents and information to the VA. All commissioning team members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- B. Scheduling: The Contractor shall work with the Commissioning Agent and the VA to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information (including, but not limited to, tasks, durations and predecessors) on commissioning activities to allow the Contractor and the VA to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction as directed by the VA.
- C. Initial Schedule of Commissioning Events: The Commissioning Agent will provide the initial schedule of primary commissioning events in the Commissioning Plan and at the commissioning coordination meetings. The Commissioning Plan will provide a format for this schedule. As construction progresses, more detailed schedules will be developed by the Contractor with information from the Commissioning Agent.
- D. Commissioning Coordinating Meetings: The Commissioning Agent will conduct periodic Commissioning Coordination Meetings of the

commissioning team to review status of commissioning activities, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.

- E. Pretesting Meetings: The Commissioning Agent will conduct pretest meetings of the commissioning team to review startup reports, Pre-Functional Checklist results, Systems Functional Performance Testing procedures, testing personnel and instrumentation requirements.
- F. Systems Functional Performance Testing Coordination: The Contractor shall coordinate testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. The Contractor shall coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. The Contractor shall provide all standard and specialized testing equipment required to perform Systems Functional Performance Testing. Test equipment required for Systems Functional Performance Testing will be identified in the detailed System Functional Performance Test Procedure prepared by the Commissioning Agent.
- B. Data logging equipment and software required to test equipment shall be provided by the Contractor.
- C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5°C (1.0°F) and a resolution of + or - 0.1°C (0.2°F). Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and following any repairs to the equipment. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

- A. The following table outlines the roles and responsibilities for the Commissioning Team members during the Construction Phase:

Construction Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Meetings	Construction Commissioning Kick Off meeting	L	A	O	P	O	
	Commissioning Meetings	L	A	O	P	O	
	Project Progress Meetings	P	A	O	L	O	
	Controls Meeting	L	A	O	P	O	
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support the OPR and BOD.	L	A	O	P	N/A	
Cx Plan & Spec	Final Commissioning Plan	L	A	R	R	O	
Schedules	Duration Schedule for Commissioning Activities	L	A	R	R	N/A	
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O	

Construction Phase (continued)		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Document Reviews	TAB Plan Review	L	A	R	R	O	
	Submittal and Shop Drawing Review	R	A	R	L	O	
	Review Contractor Equipment Startup Checklists	L	A	R	R	N/A	
	Review Change Orders, ASI, and RFI	L	A	R	R	N/A	
Site Observations	Witness Factory Testing	P	A	P	L	O	
	Construction Observation Site Visits	L	A	R	R	O	
Functional Test Protocols	Final Pre-Functional Checklists	L	A	R	R	O	
	Final Functional Performance Test Protocols	L	A	R	R	O	
Technical Activities	Issues Resolution Meetings	P	A	O	L	O	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	

B. The following table outlines the roles and responsibilities for the Commissioning Team members during the Acceptance Phase:

Acceptance Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Meetings	Commissioning Meetings	L	A	O	P	O	
	Project Progress Meetings	P	A	O	L	O	
	Pre-Test Coordination Meeting	L	A	O	P	O	
	Lessons Learned and Commissioning Report Review Meeting	L	A	O	P	O	
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support OPR and BOD	L	P	O	P	O	
Cx Plan & Spec	Maintain/Update Commissioning Plan	L	A	R	R	O	
Schedules	Prepare Functional Test Schedule	L	A	R	R	O	
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O	

Acceptance Phase (continued)		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Document Reviews	Review Completed Pre-Functional Checklists	L	A	R	R	O	
	Pre-Functional Checklist Verification	L	A	R	R	O	
	Review Operations & Maintenance Manuals	L	A	R	R	R	
	Training Plan Review	L	A	R	R	R	
	Warranty Review	L	A	R	R	O	
	Review TAB Report	L	A	R	R	O	
Site Observations	Construction Observation Site Visits	L	A	R	R	O	
	Witness Selected Equipment Startup	L	A	R	R	O	
Functional Test Protocols	TAB Verification	L	A	R	R	O	
	Systems Functional Performance Testing	L	A	O	P	P	
	Retesting	L	A	O	P	P	
Technical Activities	Issues Resolution Meetings	P	A	O	L	O	
	Systems Training	L	S	R	P	P	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	
	Final Commissioning Report	L	A	R	R	R	
	Prepare Systems Manuals	L	A	R	R	R	

Warranty Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Meetings	Post-Occupancy User Review Meeting	L	A	O	P	P	
Site Observations	Periodic Site Visits	L	A	O	O	P	
Functional Test Protocols	Deferred and/or seasonal Testing	L	A	O	P	P	
Technical Activities	Issues Resolution Meetings	L	S	O	O	P	
	Post-Occupancy Warranty Checkup and review of Significant Outstanding Issues	L	A		R	P	
Reports and Logs	Final Commissioning Report Amendment	L	A		R	R	
	Status Reports	L	A		R	R	

3.2 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS

A. The following procedures shall apply to all equipment and systems to be commissioned, according to Part 1, Systems to Be Commissioned.

1. Pre-Functional Checklists are important to ensure that the equipment and systems are hooked up and operational. These ensure that Systems Functional Performance Testing may proceed without unnecessary delays. Each system to be commissioned shall have a full Pre-Functional Checklist completed by the Contractor prior to Systems Functional Performance Testing. No sampling strategies are used.
 - a. The Pre-Functional Checklist will identify the trades responsible for completing the checklist. The Contractor shall ensure the appropriate trades complete the checklists.
 - b. The Commissioning Agent will review completed Pre-Functional Checklists and field-verify the accuracy of the completed checklist using sampling techniques.

2. Startup and Initial Checkout Plan: The Contractor shall develop detailed startup plans for all equipment. The primary role of the Contractor in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for startup shall be identified in the Startup Plan and in the checklist forms.
 - a. The Contractor shall develop the full startup plan by combining (or adding to) the checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual data and the field checkout sheets normally used by the Contractor. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
 - b. The full startup plan shall at a minimum consist of the following items:
 - 1) The Pre-Functional Checklists.
 - 2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
 - 3) The manufacturer's normally used field checkout sheets.
 - c. The Commissioning Agent will submit the full startup plan to the VA and Contractor for review. Final approval will be by the VA.
 - d. The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.
3. Sensor and Actuator Calibration
 - a. All field installed temperature, relative humidity, CO2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described in Division 23 specifications.
 - b. All procedures used shall be fully documented on the Pre-Functional Checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
4. Execution of Equipment Startup

- a. Four weeks prior to equipment startup, the Contractor shall schedule startup and checkout with the VA and Commissioning Agent. The performance of the startup and checkout shall be directed and executed by the Contractor.
- b. The Commissioning Agent will observe the startup procedures for selected pieces of primary equipment.
- c. The Contractor shall execute startup and provide the VA and Commissioning Agent with a signed and dated copy of the completed startup checklists, and contractor tests.
- d. Only individuals that have direct knowledge and witnessed that a line item task on the Startup Checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

5. Equipment Startup

- a. The systems being controlled are existing and have already had startup procedures performed under previous contracts. For purposes of this contract, the Commissioning Agent shall report any operational issues observed that affect the Functional Testing of the new control systems.

3.3 DEFICIENCIES, NONCONFORMANCE, AND APPROVAL IN CHECKLISTS AND STARTUP

- A. The Contractor shall clearly list any outstanding items of the initial startup and Pre-Functional Checklist procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies shall be provided to the VA and the Commissioning Agent within two days of completion.
- B. The Commissioning Agent will review the report and submit comments to the VA. The Commissioning Agent will work with the Contractor to correct and verify deficiencies or uncompleted items. The Commissioning Agent will involve the VA and others as necessary. The Contractor shall correct all areas that are noncompliant or incomplete in the checklists in a timely manner, and shall notify the VA and Commissioning Agent as soon as outstanding items have been corrected. The Contractor shall submit an updated startup report and a Statement of Correction on the original noncompliance report. When satisfactorily completed, the Commissioning Agent will recommend approval of the checklists and startup of each system to the VA.
- C. The Contractor shall be responsible for resolution of deficiencies as directed the VA.

3.4 DDC SYSTEM TRENDING FOR COMMISSIONING

- A. Trending is a method of testing as a standalone method or to augment manual testing. The Contractor shall trend any and all points of the system or systems at intervals specified below.
- B. Alarms are a means to notify the system operator that abnormal conditions are present in the system. Alarms shall be structured into three tiers - Critical, Priority, and Maintenance.
 - 1. Critical alarms are intended to be alarms that require the immediate attention of and action by the Operator. These alarms shall be displayed on the Operator Workstation in a popup style window that is graphically linked to the associated unit's graphical display. The popup style window shall be displayed on top of any active window within the screen, including non DDC system software.
 - 2. Priority level alarms are to be printed to a printer which is connected to the Operator's Work Station located within the engineer's office. Additionally Priority level alarms shall be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which shall require reaction from the operator or maintenance personnel within a normal work shift, and not immediate action.
 - 3. Maintenance alarms are intended to be minor issues which would require examination by maintenance personnel within the following shift. These alarms shall be generated in a scheduled report automatically by the DDC system at the start of each shift. The generated maintenance report will be printed to a printer located within the engineer's office.
- C. The Contractor shall provide a wireless internet network in the building for use during controls programming, checkout, and commissioning. This network will allow project team members to more effectively program, view, manipulate and test control devices while being in the same room as the controlled device.
- D. The Contractor shall provide graphical trending through the DDC control system of systems being commissioned. Trending requirements are indicated below and included with the Systems Functional Performance Test Procedures. Trending shall occur before, during and after Systems Functional Performance Testing. The Contractor shall be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steady state conditions as well as during the System Functional Testing. These graphical reports shall be submitted to the COR and Commissioning Agent for review and analysis before, during dynamic operation, and after Systems

Functional Performance Testing. The Contractor shall provide, but not limited to, the following trend requirements and trend submissions:

1. Pre-testing, Testing, and Post-testing - Trend reports of trend logs and graphical trend plots are required as defined by the Commissioning Agent. The trend log points, sampling rate, graphical plot configuration, and duration will be dictated by the Commissioning Agent. At any time during the Commissioning Process the Commissioning Agent may recommend changes to aspects of trending as deemed necessary for proper system analysis. The Contractor shall implement any changes as directed by the COR. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the Contractor, as directed by the COR, prior to the execution of Systems Functional Performance Testing.
2. Dynamic plotting - The Contractor shall also provide dynamic plotting during Systems Functional Performance testing at frequent intervals for points determined by the Systems Functional Performance Test Procedure. The graphical plots will be formatted and plotted at durations listed in the Systems Functional Performance Test Procedure.
3. Graphical plotting - The graphical plots shall be provided with a dual y-axis allowing 15 or more trend points (series) plotted simultaneously on the graph with each series in distinct color. The plots will further require title, axis naming, legend etc. all described by the Systems Functional Performance Test Procedure. If this cannot be sufficiently accomplished directly in the Direct Digital Control System then it is the responsibility of the Contractor to plot these trend logs in Microsoft Excel.
4. The following tables indicate the points to be trended and alarmed by system. The Operational Trend Duration column indicates the trend duration for normal operations. The Testing Trend Duration column indicates the trend duration prior to Systems Functional Performance Testing and again after Systems Functional Performance Testing. The Type column indicates point type: AI = Analog Input, AO = Analog Output, DI = Digital Input, DO = Digital Output, Calc = Calculated Point. In the Trend Interval Column, COV = Change of Value. The Alarm Type indicates the alarm priority; C = Critical, P = Priority, and M = Maintenance. The Alarm Range column indicates when the point is considered in the alarm state. The Alarm Delay column indicates the length of time the point must remain in an alarm state before the alarm is recorded in the DDC. The intent is to allow minor, short-duration events to be corrected by the DDC system prior to recording an alarm.

E. The Contractor shall provide the following information prior to Systems Functional Performance Testing. Any documentation that is modified after submission shall be recorded and resubmitted to the COR and Commissioning Agent.

1. Point-to-Point checkout documentation;
2. Sensor field calibration documentation including system name, sensor/point name, measured value, DDC value, and Correction Factor.
3. A sensor calibration table listing the referencing the location of procedures to following in the O&M manuals, and the frequency at which calibration should be performed for all sensors, separated by system, subsystem, and type. The calibration requirements shall be submitted both in the O&M manuals and separately in a standalone document containing all sensors for inclusion in the commissioning documentation. The following table is a sample that can be used as a template for submission.

SYSTEM		
Sensor	Calibration Frequency	O&M Calibration Procedure Reference
Discharge air temperature	Once a year	Volume I Section D.3.aa
Discharge static pressure	Every 6 months	Volume II Section A.1.c

4. Loop tuning documentation and constants for each loop of the building systems. The documentation shall be submitted in outline or table separated by system, control type (e.g. heating valve temperature control); proportional, integral and derivative constants, interval (and bias if used) for each loop. The following table is a sample that can be used as a template for submission.

AIR HANDLING UNIT AHU-1				
Control Reference	Proportional Constant	Integral Constant	Derivative Constant	Interval
Heating Valve Output	1000	20	10	2 sec.

3.5 SYSTEMS FUNCTIONAL PERFORMANCE TESTING

- A. This paragraph applies to Systems Functional Performance Testing of systems for all referenced specification Divisions.

- B. Objectives and Scope: The objective of Systems Functional Performance Testing is to demonstrate that each system is operating according to the Contract Documents. Systems Functional Performance Testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of noncompliant performance are identified and corrected, thereby improving the operation and functioning of the systems. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, fire alarm and emergency power) where there is a specified system response. The Contractor shall verify each sequence in the sequences of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.
- C. Development of Systems Functional Performance Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor shall submit all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements found in the Contract Documents and approved submittals and shop drawings, the Commissioning Agent will develop specific Systems Functional Test Procedures to verify and document proper operation of each piece of equipment and system to be commissioned. The Contractor shall assist the Commissioning Agent in developing the Systems Functional Performance Test procedures as requested by the Commissioning Agent i.e. by answering questions about equipment, operation, sequences, etc. Prior to execution, the Commissioning Agent will provide a copy of the Systems Functional Performance Test procedures to the VA, the Architect/Engineer, and the Contractor, who shall review the tests for feasibility, safety, equipment and warranty protection.
- D. Purpose of Test Procedures: The purpose of each specific Systems Functional Performance Test is to verify and document compliance with the stated criteria of acceptance given on the test form. Representative test formats and examples are found in the Commissioning Plan for this project. (The Commissioning Plan is issued as a separate document and is available for review.) The test procedure forms developed by the Commissioning Agent will include, but not be limited to, the following information:
1. System and equipment or component name(s)
 2. Equipment location and ID number
 3. Unique test ID number, and reference to unique Pre-Functional Checklists and startup documentation, and ID numbers for the piece of equipment

4. Date
 5. Project name
 6. Participating parties
 7. A copy of the specification section describing the test requirements
 8. A copy of the specific sequence of operations or other specified parameters being verified
 9. Formulas used in any calculations
 10. Required pretest field measurements
 11. Instructions for setting up the test.
 12. Special cautions, alarm limits, etc.
 13. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
 14. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
 15. A section for comments.
 16. Signatures and date block for the Commissioning Agent. A place for the Contractor to initial to signify attendance at the test.
- E. Test Methods: Systems Functional Performance Testing shall be achieved by manual testing (i.e. persons manipulate the equipment and observe performance) and/or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by standalone data loggers. The Contractor and Commissioning Agent shall determine which method is most appropriate for tests that do not have a method specified.
1. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, although timing the testing to experience actual conditions is encouraged wherever practical.
 2. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for

the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

3. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
 4. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the Air Conditioning compressor lockout initiate at an outside air temperature below 12°C (54°F), when the outside air temperature is above 12°C (54°F), temporarily change the lockout setpoint to be 2°C (4°F) above the current outside air temperature.
 5. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification shall be completed during systems startup and initial checkout.
- F. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.
- G. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance Test Procedures execution. The Commissioning Agent will determine the sampling rate. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.
- H. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the

responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

- I. Coordination and Scheduling: The Contractor shall provide a minimum of 7 days' notice to the Commissioning Agent and the VA regarding the completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Commissioning Agent will schedule Systems Functional Performance Tests with the Contractor and VA. The Commissioning Agent will witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.
- J. Testing Prerequisites: In general, Systems Functional Performance Testing will be conducted only after Pre-Functional Checklists have been satisfactorily completed. The control system shall be sufficiently tested and approved by the Commissioning Agent and the VA before it is used to verify performance of other components or systems. The air balancing and water balancing shall be completed before Systems Functional Performance Testing of air-related or water-related equipment or systems are scheduled. Systems Functional Performance Testing will proceed from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems will be checked.
- K. Problem Solving: The Commissioning Agent will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor.

3.6 DOCUMENTATION, NONCONFORMANCE AND APPROVAL OF TESTS

- A. Documentation: The Commissioning Agent will witness, and document the results of all Systems Functional Performance Tests using the specific procedural forms developed by the Commissioning Agent for that purpose. Prior to testing, the Commissioning Agent will provide these forms to the VA and the Contractor for review and approval. The Contractor shall include the filled out forms with the O&M manual data.
- B. Nonconformance: The Commissioning Agent will record the results of the Systems Functional Performance Tests on the procedure or test form. All items of nonconformance issues will be noted and reported to the VA on Commissioning Field Reports and/or the Commissioning Master Issues Log.
 - 1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of

noncompliance and resolution shall be documented on the Systems Functional Test Procedure.

2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the VA.
3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
4. When there is no dispute on an item of noncompliance, and the Contractor accepts responsibility to correct it:
 - a. The Commissioning Agent will document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the Commissioning Agent will submit a Commissioning Field Report to the VA. The Commissioning Agent will also note items of noncompliance and the Contractor's response in the Master Commissioning Issues Log. The Contractor shall correct the item of noncompliance and report completion to the VA and the Commissioning Agent.
 - b. The need for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.
5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:
 - a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor's response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.
 - b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the Department of Veterans Affairs.

- c. The Commissioning Agent will document the resolution process.
 - d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.
- C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance specifications, all identical units may be considered unacceptable by the VA. In such case, the Contractor shall provide the VA with the following:
- 1. Within one week of notification from the VA, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the VA within two weeks of the original notice.
 - 2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
 - 3. The VA shall determine whether a replacement of all identical units or a repair is acceptable.
 - 4. Two examples of the proposed solution shall be installed by the Contractor and the VA shall be allowed to test the installations for up to one week, upon which the VA will decide whether to accept the solution.
 - 5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

- E. Approval: The Commissioning Agent will note each satisfactorily demonstrated function on the test form. Formal approval of the Systems Functional Performance Test shall be made later after review by the Commissioning Agent and by the VA. The Commissioning Agent will evaluate each test and report to the VA using a standard form. The VA will give final approval on each test using the same form, and provide signed copies to the Commissioning Agent and the Contractor.

3.7 DEFERRED TESTING

- A. Unforeseen Deferred Systems Functional Performance Tests: If any Systems Functional Performance Test cannot be completed due to the building structure, required occupancy condition or other conditions, execution of the Systems Functional Performance Testing may be delayed upon approval of the VA. These Systems Functional Performance Tests shall be conducted in the same manner as the seasonal tests as soon as possible. Services of the Contractor to conduct these unforeseen Deferred Systems Functional Performance Tests shall be negotiated between the VA and the Contractor.
- B. Deferred Seasonal Testing: Deferred Seasonal Systems Functional Performance Tests are those that must be deferred until weather conditions are closer to the systems design parameters. The Commissioning Agent will review systems parameters and recommend which Systems Functional Performance Tests should be deferred until weather conditions more closely match systems parameters. The Contractor shall review and comment on the proposed schedule for Deferred Seasonal Testing. The VA will review and approve the schedule for Deferred Seasonal Testing. Deferred Seasonal Systems Functional Performances Tests shall be witnessed and documented by the Commissioning Agent. Deferred Seasonal Systems Functional Performance Tests shall be executed by the Contractor in accordance with these specifications.

3.8 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

- A. Training Preparation Conference: Before operation and maintenance training, the Commissioning Agent will convene a training preparation conference to include VA's COR, VA's Operations and Maintenance personnel, and the Contractor. The purpose of this conference will be to discuss and plan for Training and Demonstration of VA Operations and Maintenance personnel.
- B. The Contractor shall provide training and demonstration as required by other Division 23 and Division 26 sections. The Training and Demonstration shall include, but is not limited to, the following:
 - 1. Review the Contract Documents.

2. Review installed systems, subsystems, and equipment.
 3. Review instructor qualifications.
 4. Review instructional methods and procedures.
 5. Review training module outlines and contents.
 6. Review course materials (including operation and maintenance manuals).
 7. Review and discuss locations and other facilities required for instruction.
 8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
 9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.
- C. Training Module Submittals: The Contractor shall submit the following information to the VA and the Commissioning Agent:
1. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module. At completion of training, submit two complete training manuals for VA's use.
 2. Qualification Data: Submit qualifications for facilitator and/or instructor.
 3. Attendance Record: For each training module, submit list of participants and length of instruction time.
 4. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.
 5. Demonstration and Training Recording:
 - a. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.

- b. Video Format: Provide high quality color DVD color on standard size DVD disks.
- c. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
- d. Narration: Describe scenes on video recording by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
- e. Submit two copies within seven days of end of each training module.

D. Quality Assurance:

- 1. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- 2. Instructor Qualifications: A factory authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- 3. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.

E. Training Coordination:

- 1. Coordinate instruction schedule with VA's operations. Adjust schedule as required to minimize disrupting VA's operations.
- 2. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- 3. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the VA.

F. Instruction Program:

- 1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

- a. General: Also refer to specific commissioning and technical sections in Division 23 and Division 26 whether or not they are specifically referenced below.
 - b. HVAC systems, including air handling equipment, air distribution systems, and terminal equipment and devices.
 - c. HVAC instrumentation and controls.
 - d. Electrical service and distribution, including panelboards and uninterruptible power supplies.
- G. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participants are expected to master. For each module, include instruction for the following:
- 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:

- a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.

7. Maintenance: Include the following:

- a. Inspection procedures.
- b. Types of cleaning agents to be used and methods of cleaning.
- c. List of cleaning agents and methods of cleaning detrimental to product.
- d. Procedures for routine cleaning
- e. Procedures for preventive maintenance.
- f. Procedures for routine maintenance.
- g. Instruction on use of special tools.

8. Repairs: Include the following:

- a. Diagnosis instructions.
- b. Repair instructions.
- c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

H. Training Execution:

- 1. Preparation: Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual. Set up instructional equipment at instruction location.
- 2. Instruction:
 - a. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and the VA for number of participants, instruction times, and location.
 - b. Instructor: Engage qualified instructors to instruct VA's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1) The Commissioning Agent will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.

- 2) The VA will furnish an instructor to describe VA's operational philosophy.
- 3) The VA will furnish the Contractor with names and positions of participants.
3. Scheduling: Provide instruction at mutually agreed times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with the VA and the Commissioning Agent with at least seven days' advance notice.
4. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, or a written, performance-based test.
5. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

I. Demonstration and Training Recording:

1. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
2. Video Format: Provide high quality color DVD color on standard size DVD disks.
3. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
4. Narration: Describe scenes on videotape by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 02 41 00
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies demolition and removal of portions of buildings, utilities, and general construction shown on the drawings.

1.2 RELATED WORK:

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 35 26, SAFETY REQUIREMENTS.
- C. Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- D. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.
- E. Section 31 20 00, EARTHWORK.

1.3 PROTECTION:

- A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with ongoing 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 selective demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
- C. 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. Observe existing materials and be aware of hazardous or biomedical containment.
- D. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
 - 1. 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. Obtain hot work permit from COR.

2. Keep fire hydrants and truck access lanes clear and accessible at all times. Prohibit debris from accumulating within a radius of 15 feet of fire hydrants.
- F. Before beginning any demolition work, the Contractor shall survey the site and all interior spaces in this project and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the BCVAMC Healthcare System; any damaged items shall be repaired or replaced as approved by the COR. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall 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 COR's approval.
- G. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- H. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS and Section 01 35 26, SAFETY REQUIREMENTS.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DEMOLITION:

- A. Debris, including any concrete, stone, metals, and similar materials shall become property of Contractor and shall be disposed of by him daily, off the site to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the COR. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 24 inches square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.
- B. Remove and legally dispose of all materials, other than earth to remain as part of project work. 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.

- C. 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 COR. When Utility lines are encountered that are not indicated on the drawings, the COR shall be notified prior to further work in that area.
- D. Selectively items are to be demolished at affected areas. See drawings.

3.2 CLEAN-UP:

- A. On completion of work of this section and after removal of all debris, and completion of new work leave all areas of the site and interior spaces in clean condition satisfactory to COR. Clean-up shall include 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.
- B. Materials or debris shall be disposed in licensed disposal sites.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 02 81 00
TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS

PART 1 - GENERAL

1.1. CONTRACT DOCUMENTS AND RELATED REQUIREMENTS

- A. Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show or describe 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, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work. In the event the Contractor/Sub-Contractor discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the VA Representative for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor/Sub-Contractor without obtaining guidance from the VA Representative shall become the sole risk and responsibility of the Contractor/Sub-Contractor. All costs incurred due to such action are also the responsibility of the Contractor/Sub-Contractor.

1.2. RELATED WORK

- A. 01 35 26 SAFETY REQUIREMENTS
- B. 02 41 00 SELECTIVE DEMOLITION
- C. 02 82 00 ASBESTOS REMEDIATION
- D. 02 83 00 LEAD REMEDIATION
- E. 02 84 16 HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY
- F. 07 84 00 FIRESTOPPING
- G. Division 09 FINISHES

1.3. REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. All work under this contract shall be done in strict accordance with all applicable federal, state, and local regulations, standards and codes governing hazardous materials-related work,

and any other trade work done in conjunction with the project. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.

- C. The most recent edition of any relevant regulation, standard, document, or code shall be in effect. Where conflict among the requirements or with these specifications exists, the most stringent requirement(s) shall be utilized.
- D. All related regulations, statutes, public laws, registers, and regulatory guidance are incorporated by reference.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

IATA DGR (2018) Dangerous Goods Regulations

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

29 CFR 1926.59	Hazard Communication
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 302	Designation, Reportable Quantities, and Notification

40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

ADMINISTRATIVE RULES OF SOUTH DAKOTA (ARSD)

Article 74:27	Solid Waste
Article 74:28	Hazardous Waste
Article 74:34	Regulated Substance Discharges

1.4. DEFINITIONS

A. Hazardous Material

1. A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant to the Hazardous Materials Transportation Act, 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

B. Hazardous Waste

1. A waste which meets criteria established in RCRA or specified by the EPA in 40 CFR 261, or the state of South Dakota in ARSD Article 74:27, ARSD Article 74:28, and ARSD Article 74:34.

C. VA Representative

1. The VA official responsible for on-going project work.

1.5. SUBMITTALS

- A. Submit the following in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES:

1. Packaging Notifications

2. Hazardous Waste Management Plan
3. Onsite Hazardous Waste Management
4. Notices of Non-Compliance and Notices of Violation
5. Recordkeeping
6. Exception Report
7. Spill Response
8. Transportation and Disposal Coordinator
9. Training
10. Certification
11. Shipping Documents and Packagings Certification
12. Security Plan
13. Certificates of Disposal
14. Waste Minimization

1.6. QUALITY ASSURANCE

A. Transportation and Disposal Coordinator

1. Designate, by position and title, one person to act as the Transportation and Disposal Coordinator (TDC) for this contract. The TDC must serve as the single point of contact for all environmental regulatory matters and have overall responsibility for total environmental compliance at the site including, but not limited to, accurate identification and classification of hazardous waste and hazardous materials; determination of proper shipping names; identification of marking, labeling, packaging and placarding requirements; completion of waste profiles, hazardous waste manifests, asbestos waste shipment records, PCB manifests, bill of lading, exception and discrepancy reports; and all other environmental documentation. The TDC must have, at a minimum, five years of specialized experience in the management and transportation of hazardous waste and have been Department of Transportation certified under 49 CFR 172, Subpart H.

B. Training

1. Hazardous materials employees must be trained, tested, and certified to safely and effectively carry out their assigned duties in accordance with 29 CFR 1926.59, 29 CFR 1926.65, and 49 CFR 172, Subpart H. Employees transporting hazardous materials or preparing hazardous materials for transportation, including samples, must be trained, tested,

and certified in accordance with 49 CFR 172, Subpart H, including security awareness and any applicable security plans. Hazardous material employees must also be trained in accordance with IATA DGR when shipping hazardous materials by air.

C. Certification

1. The hazardous materials transporter must possess a current certificate of registration issued by the Research and Special Programs Administration (RSPA), U.S. Department of Transportation, when required by 49 CFR 107, Subpart G. Submit copies of the certificates or written statements certifying exemption from these requirements.

1.7. LAWS AND REGULATIONS REQUIREMENTS

- A. Comply with Federal, state, and local laws and regulations which are applicable. These requirements are amended frequently and compliance with amendments is required as they become effective. Notify the Contracting Officer immediately if compliance exceeds the scope of work or conflicts with specific requirements of the contract.

1. ARSD Article 74:27 Solid Waste
2. ARSD Article 74:28 Hazardous Waste
3. ARSD Article 74:34 Regulated Substance Discharges

PART 2 - PRODUCTS

2.1. MATERIALS

- A. Provide all the materials required for the packaging, labeling, marking, placarding and transportation of hazardous wastes and hazardous materials in conformance with Department of Transportation standards and IATA DGR. Details in this specification must not be construed as establishing the limits of the Contractor's responsibility.

2.2. PACKAGINGS

- A. Provide bulk and non-bulk containers for packaging hazardous materials/wastes consistent with the authorizations referenced in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 8. Bulk and non-bulk packaging must meet the corresponding specifications in 49 CFR 173 referenced in the Hazardous Materials Table, 49 CFR 172, Section .101. Packaging must conform to the general packaging requirements of Subpart B of 49 CFR 173, to the requirements of 49 CFR 178 at the specified packing group performance level, to the requirements of special provisions of column 7 of the Hazardous Materials Table in 49 CFR 172, Section .101, and be compatible with the

material to be packaged as required by 40 CFR 262. Also provide other packaging related materials such as materials used to cushion or fill voids in overpacked containers. The hazardous materials being packaged must not react dangerously with, decompose, or ignite the sorbent packaging materials. Additionally, sorbents used to treat free liquids to be disposed of in landfills must be non-biodegradable as specified in 40 CFR 264, Section .314. In addition, packaging notifications will be provided to the Government in accordance with 49 CFR 172, Section .178.2(c) regarding type and dimensions of closures, including gaskets, needed to satisfy performance test requirements.

2.3. MARKINGS

- A. Provide markings for each hazardous material/waste package, freight container, and transport vehicle consistent with the requirements of 49 CFR 172, Subpart D; 40 CFR 262, Section .32 (for hazardous waste); 40 CFR 761, Section .45 (for PCBs); and 40 CFR 61, Section .149(d) (for asbestos). Markings must withstand a 180-day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.4. LABELING

- A. Provide primary and subsidiary labels for hazardous materials/wastes consistent with the requirements in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 6. Labels must meet design specifications required by 49 CFR 172, Subpart E including size, shape, color, printing, and symbol requirements. Labels must be durable weather resistant and withstanding a 180-day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.5. PLACARDS

- A. For each offsite shipment of hazardous material/waste, provide primary and subsidiary placards consistent with the requirements of 49 CFR 172, Subpart F. Provide placards for each side and each end of bulk packaging, freight containers, transport vehicles, and rail cars requiring such placarding. Placards may be plastic, metal, or other material capable of withstanding, without deterioration, a 30-day exposure to open weather conditions and must meet design requirements specified in 49 CFR 172, Subpart F.

2.6. SPILL RESPONSE MATERIALS

- A. Provide spill response materials including, but not limited to, containers, adsorbent, shovels, and personal protective

equipment. Spill response materials must be available at all times when hazardous materials/wastes are being handled or transported. Spill response materials must be compatible with the type of material being handled.

2.7. EQUIPMENT AND TOOLS

- A. Provide miscellaneous equipment and tools necessary to handle hazardous materials and hazardous wastes in a safe and environmentally sound manner.

PART 3 - EXECUTION

3.1. HAZARDOUS WASTE MANAGEMENT PLAN

- A. Prepare a Hazardous Waste Management Plan detailing the manner in which hazardous wastes will be managed and describing the types and volumes of hazardous wastes anticipated to be managed. The plan must address both onsite and offsite hazardous waste management. Describe the methods to be used to ensure accurate piece counts or weights of shipments; describe waste minimization methods; identify and describe facilities to be used for treatment, storage, and disposal (TSD); identify areas onsite where hazardous wastes are to be handled; and identify whether transfer facilities are to be used; and if so, how the wastes will be tracked to ultimate disposal. Submit the plan to the Contracting Officer for approval prior to start of work. Submit written documentation of weekly hazardous waste inspections on a monthly basis.

3.2. ONSITE HAZARDOUS WASTE MANAGEMENT

- A. Coordinate the onsite management of all hazardous materials and waste with the VA Representative. These paragraphs apply to Government owned waste only. The Contractor is responsible for ensuring compliance with federal, state, and local hazardous waste laws and regulations and verifying those requirements when preparing reports, waste shipment records, hazardous waste manifests, or other documents. Identify hazardous wastes using criteria set forth in 40 CFR 261 or applicable state and local laws, regulations, and ordinances. Comply with generator requirements in 40 CFR 262 when accumulating hazardous waste onsite. Onsite accumulation times must be restricted to applicable time frames referenced in 40 CFR 262, Section .34 or as otherwise directed by the VA Representative. Accumulation start dates commence when waste container is transferred into a 90 day accumulation site or permitted storage facility. Only use containers in good condition and compatible with the waste to be stored. Ensure containers are closed except when adding or removing waste, and immediately mark all hazardous waste containers with the words "hazardous waste" and other information required by 40 CFR 262, Section .32 as soon as the

waste is containerized. An additional marking must be placed on containers of "unknowns" designating the date sampled, and the suspected hazard. Inspect containers for signs of deterioration and for responding to any spills or leaks. Inspect all hazardous waste areas weekly and provide written documentation of the inspection. Include date and time of inspection, name of individual conducting the inspection, problems noted, and corrective actions taken on the inspection logs.

3.3. HAZARDOUS WASTE CLASSIFICATION

- A. Identify all waste codes applicable to each hazardous waste stream based on requirements in 40 CFR 261 or applicable state or local law or regulation. Also identify applicable treatment standards in 40 CFR 268 and state land disposal restrictions and make a determination as to whether or not the waste meets or exceeds the standards. Submit waste profiles, analyses, classification, and treatment standards information to VA Representative for review and approval.

3.4. OFFSITE HAZARDOUS WASTE MANAGEMENT

- A. Coordinate the offsite transfer of all hazardous materials and waste with the VA Representative. Use RCRA Subtitle C permitted facilities which meet the requirements of 40 CFR 264 or facilities operating under interim status which meet the requirements of 40 CFR 265. Do not use offsite treatment, storage, and disposal facilities with significant RCRA violations or compliance problems (such as facilities known to be releasing hazardous constituents into ground water, surface water, soil, or air). Submit Notices of Non-Compliance and Notices of Violation by a federal, state, or local regulatory agency issued to the Contractor in relation to any work performed under this contract. Immediately provide copies of such notices to the Contracting Officer. Also furnish relevant documents regarding the incident and any information requested by the VA Representative and coordinate its response to the notice with the VA Representative prior to submission to the notifying authority. Also furnish a copy to the VA Representative of all documents submitted to the regulatory authority, including the final reply to the notice, and all other materials, until the matter is resolved.

3.5. TREATMENT, STORAGE, AND DISPOSAL FACILITY AND TRANSPORTER

- A. Provide the VA Representative with EPA ID numbers, names, locations, and telephone numbers of TSD facilities and transporters. This information must be contained in the Hazardous Waste Management Plan and be approved by the VA Representative prior to waste disposal.

3.6. FACILITY STATUS INFORMATION

- A. Facilities receiving hazardous waste must be permitted in accordance with 40 CFR 270 or operating under interim status in accordance with 40 CFR 265 requirements or permitted by a state authorized by the Environmental Protection Agency to administer the RCRA permit program. Additionally, prior to using a TSD Facility, contact the EPA Regional Offsite Coordinator specified in 40 CFR 300, Section .440, to determine the facility's status, and document all information necessary to satisfy the requirements of the EPA Offsite policy and submit this information to the VA Representative in the Hazardous Waste Management Plan.

3.7. SHIPPING DOCUMENTS AND PACKAGINGS CERTIFICATION

- A. Prior to shipment of any hazardous material offsite, and a minimum of 5 days prior to anticipated pickup, provide for review written certification to the VA Representative that hazardous materials have been properly packaged, labeled, and marked in accordance with Department of Transportation and EPA requirements. Furnish designated disposal facility packaging assurances not later than 35 days after acceptance of the shipment. The Contractor's TDC must also provide written certification regarding waste minimization efforts documenting that efforts have been taken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.8. TRANSPORTATION

- A. Prior to conducting hazardous materials activities, the Contractor responsible for pre-transportation activities must either certify to the Government that a Security Plan is in place which meets the requirements of 49 CFR 172, Subpart I or in the event that the types or amounts of hazardous materials are excluded from the security planning requirements, a written statement to that effect detailing the basis for the exception. Use manifests for transporting hazardous wastes as required by 40 CFR 263 or applicable state or local law or regulation. Transportation must comply with all requirements in the Department of Transportation referenced regulations in the 49 CFR series. Prepare hazardous waste manifests for each shipment of hazardous waste shipped offsite. Complete manifests using instructions in 40 CFR 262, Subpart B and applicable state or local law or regulation. Submit manifests and waste profiles to the VA Representative for review and approval. Prepare land disposal restriction notifications as required by 40 CFR 268 or applicable state or local law or regulation for each shipment of hazardous waste. Submit notifications with the manifest to the VA Representative for review and approval.

3.9. TREATMENT AND DISPOSAL OF HAZARDOUS WASTES

- A. Coordinate any offsite shipments of hazardous materials or hazardous wastes with the VA Representative. Initial, or satellite hazardous waste accumulation is limited to 55 gallons (or 1 quart of acutely hazardous waste). Once a waste stream exceeds 55 gallons, it must be transferred to an on-site 90-day (180-day small quantity generator) accumulation area, or a permitted hazardous waste treatment, storage, or disposal facility within three days. Ship hazardous wastes only to facilities which are properly permitted to accept the hazardous waste or operating under interim status. Ensure wastes are treated to meet land disposal treatment standards in 40 CFR 268 prior to land disposal. Propose TSD facilities via submission of the Hazardous Waste Management Plan, subject to the approval of the VA Representative. Submit Certificates of Disposal documenting the ultimate disposal, destruction or placement of hazardous wastes, polychlorinated biphenyls (PCBs), and asbestos within 90 days of initial shipment. Receipt of these certificates will be required for final payment.

3.10. IDENTIFICATION OF PROPER SHIPPING NAMES

- A. Use 49 CFR 172, Section .101 to identify proper shipping names for each hazardous material (including hazardous wastes) to be shipped offsite. Submit proper shipping names to the VA Representative in the form of draft shipping documents for review and approval.

3.11. PACKAGING, LABELING, AND MARKING

- A. Package, label, and mark hazardous materials/wastes using the specified materials and in accordance with the referenced authorizations. Mark each container of hazardous waste of 110 gallons or less with the following:
1. "HAZARDOUS WASTE - Federal Law Prohibits Improper Disposal.
 2. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
 3. Generator's name _____.
 4. Manifest Document Number _____.

3.12. OTHER HAZARDOUS MATERIAL SHIPMENT DOCUMENTS

- A. Prepare a bill of lading for each shipment of hazardous material which is not accompanied by a hazardous waste manifest which fulfills the shipping paper requirements. The bill of lading must satisfy the requirements of 49 CFR 172, Subpart C, and applicable state or local law or regulation, and must be submitted to the VA Representative for review and approval. For laboratory samples and treatability study samples, prepare bills

of lading and other documentation as necessary to satisfy conditions of the sample exclusions in 40 CFR 261, Section .4(d) and (e) and any applicable state or local law or regulation. Bill of ladings requiring shipper's certifications must be signed by the Government.

3.13. SHIPPING DOCUMENTS

- A. Ensure that each shipment of hazardous material sent offsite is accompanied by properly completed shipping documents. This includes shipments of samples that may potentially meet the definition of a Department of Transportation regulated hazardous material.

3.14. WASTE MINIMIZATION

- A. Minimize the generation of hazardous waste to the maximum extent practicable and take all necessary precautions to avoid mixing clean and contaminated wastes. Identify and evaluate recycling and reclamation options as alternatives to land disposal. Requirements of 40 CFR 266 apply to: hazardous wastes recycled in a manner constituting disposal; hazardous waste burned for energy recovery; lead-acid battery recycling; and hazardous wastes with economically recoverable precious metals. Submit written certification that waste minimization efforts have been undertaken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.15. RECORDKEEPING

- A. Maintain adequate records to support information provided to the VA Representative regarding exception reports, annual reports, and biennial reports; and maintain bill of ladings for a minimum of 375 days from the date of shipment or longer period required by applicable law or regulation or other provision of this contract. Submit information necessary to file state annual or EPA biennial reports for hazardous waste transported, treated, stored, or disposed of under this contract. Do not forward these data directly to the regulatory agency but to the VA Representative at the specified time. Submit the information necessary for filing of the formal reports in the form and format required by the governing federal or state regulatory agency. A cover letter must accompany the data to include the contract number, Contractor name, and project location. In the events that a manifest copy documenting receipt of hazardous waste at the treatment storage and disposal facility is not received within 35 days of shipment initiation, or that a manifest copy documenting receipt of PCB waste at the designated facility is not received within 35 days of shipment initiation,

prepare and submit an exception report to the VA Representative within 37 days of shipment initiation.

3.16. SPILL RESPONSE

- A. In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), or pollutant or contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), notify the VA Representative immediately. Direction from the VA Representative concerning a spill or release is not considered a change under the contract. If the spill exceeds a reporting threshold, follow the pre-established procedures for immediate reporting to the VA Representative. Comply with applicable requirements of federal, state, or local laws or regulations regarding any spill incident.

3.17. EMERGENCY CONTACTS

- A. Comply with the emergency contact provisions in 49 CFR 172, Section .604. Whenever the Contractor ships hazardous materials, provide a 24-hour emergency response contact and phone number of a person knowledgeable about the hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. Monitor the phone on a 24-hour basis at all times when the hazardous materials are in transportation, including during storage incidental to transportation. Ensure that information regarding this emergency contact and phone number are placed on all hazardous material shipping documents. Designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

1. The name of the emergency coordinator.
2. Phone number through which the emergency coordinator can be contacted on a 24-hour basis.
3. The telephone number of the local fire department.
4. The location of fire extinguishers and spill control materials.

- - - End of Section - - -

SECTION 02 82 00
ASBESTOS REMEDIATION

PART 1 - GENERAL

1.1.CONTRACT DOCUMENTS AND RELATED REQUIREMENTS:

- A. Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show or describe 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, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work. In the event the Contractor/Sub-Contractor discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the VA Representative for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor/Sub-Contractor without obtaining guidance from the VA Representative shall become the sole risk and responsibility of the Contractor/Sub-Contractor. All costs incurred due to such action are also the responsibility of the Contractor/Sub-Contractor.

1.2.RELATED WORK

- A. 01 35 26 SAFETY REQUIREMENTS
- B. 02 41 00 SELECTIVE DEMOLITION
- C. 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
- D. 02 83 00 LEAD REMEDIATION
- E. 02 84 16 HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY
- F. 07 84 00 FIRESTOPPING
- G. Division 09 FINISHES

1.3.REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. All work under this contract shall be done in strict accordance with all applicable federal, state, and local regulations, standards and codes governing asbestos work, and any other trade

work done in conjunction with the project. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.

- C. The most recent edition of any relevant regulation, standard, document, or code shall be in effect. Where conflict among the requirements or with these specifications exists, the most stringent requirement(s) shall be utilized.
- D. All related regulations, statutes, public laws, registers, and regulatory guidance are incorporated by reference.

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP Z9.2 (2018) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

ASTM INTERNATIONAL (ASTM)

ASTM C732 (2006; R 2012) Aging Effects of Artificial Weathering on Latex Sealants

ASTM D522/D522M (2017) Mandrel Bend Test of Attached Organic Coatings

ASTM D2794 (1993; R 2019) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

ASTM D4397 (2016) Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications

ASTM E84 (2020) Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM E96/E96M (2016) Standard Test Methods for Water Vapor Transmission of Materials

ASTM E119 (2020) Standard Test Methods for Fire Tests of Building Construction and Materials

ASTM E736/E736M (2017) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

ASTM E1368 (2014) Visual Inspection of Asbestos Abatement Projects

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7 (2014) Compressed Air for Human Respiration; 6th Edition

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z87.1 (2020) Occupational and Educational Personal Eye
and Face Protection Devices

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701 (2019) Standard Methods of Fire Tests for Flame
Propagation of Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH NMAM (2016; 5th Ed) NIOSH Manual of Analytical Methods

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90/018 (1990) Asbestos/NESHAP Regulated Asbestos
Containing Materials Guidance

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

29 CFR 1910.147 The Control of Hazardous Energy (Lock Out/Tag
Out)

29 CFR 1926.33 Access to Employee Exposure and Medical Records

29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists

29 CFR 1926.59 Hazard Communication

29 CFR 1926.103 Respiratory Protection

29 CFR 1926.1101 Asbestos

40 CFR 61-SUBPART A General Provisions

40 CFR 61-SUBPART M National Emission Standard for Asbestos

40 CFR 763 Asbestos

49 CFR 107 Hazardous Materials Program Procedures

49 CFR 171 General Information, Regulations, and Definitions

49 CFR 172 Hazardous Materials Table, Special Provisions,
Hazardous Materials Communications, Emergency
Response Information, and Training Requirements

49 CFR 173 Shippers - General Requirements for Shipments and
Packagings

ADMINISTRATIVE RULES OF SOUTH DAKOTA

Article 74:27 Solid Waste

Article 74:28 Hazardous Waste

Article 74:31 Asbestos Control Program

Article 74:34 Regulated Substance Discharges

Article 74:36 Air Pollution Control Program

UNDERWRITERS LABORATORIES (UL)

UL 586 (2009; Reprint Dec 2017) UL Standard for Safety
High-Efficiency Particulate, Air Filter Units

1.4.DEFINITIONS

A. ACM

1. Asbestos Containing Materials.

B. Amended Water

1. Water containing a wetting agent or surfactant with a maximum surface tension of 0.00042 psi.

C. Area Sampling

1. Sampling of asbestos fiber concentrations which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

D. Asbestos

1. The term asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content of the material is determined to be at least one percent.

E. Asbestos Control Area

1. That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

F. Asbestos Fibers

1. Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.

G. Asbestos Permissible Exposure Limit

1. 0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

H. Authorized Person

1. Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

I. Background

1. The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

J. Competent Person (CP)

1. A person meeting the requirements for competent person as specified in 29 CFR 1926.1101 including a person capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them and is specifically trained in a training course which meet the criteria of EPA's Model Accreditation Plan (40 CFR 763) for project designer and supervisor.

K. Contractor/Sub-Contractor

1. The Contractor/Sub-Contractor is that individual or entity under contract to perform the herein listed work.

L. Contractor's Professional Industrial Hygienist (CPIH/CIH)

1. The Contractor's industrial hygienist who is trained in the recognition and control of asbestos hazards in accordance with current federal, state, and local regulations. The CPIH/CIH must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

M. Disposal Bag

1. A 6-mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926.1101, used for transporting asbestos waste from containment to disposal site.

N. Disturbance

1. Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in one standard sized glovebag or waste bag, not larger than 60 inches in length and width in order to access a building component.

O. Encapsulation

1. The reduction of an asbestos hazard through the appropriate use of chemical encapsulants.

P. Encapsulants

1. Specific materials in various forms used to chemically or physically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.
2. Removal Encapsulant (can be used as a wetting agent).
3. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material).
4. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage and must penetrate at least 13 mm (1/2 inches).
5. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed).

Q. Friable Asbestos Material

1. A term defined in 40 CFR 61-SUBPART M and EPA 340/1-90/018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

R. Glovebag Technique

1. Those asbestos removal and control techniques put forth in 29 CFR 1926.1101.

S. HEPA Filter Equipment

1. High efficiency particulate air (HEPA) filtered vacuum and exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters must retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

T. Model Accreditation Plan (MAP)

1. USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763.

U. Negative Pressure Enclosure (NPE)

1. That engineering control technique described as a negative pressure enclosure in 29 CFR 1926.1101.

V. NESHAP

1. National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61-SUBPART M.

W. Nonfriable Asbestos Material

1. Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage, or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

X. Permissible Exposure Limits (PELs)

1. PEL-Time Weighted Average (TWA)
 - a. Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8-hour time weighted average (TWA).
2. PEL-Excursion Limit
 - a. An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes.

Y. Personal Sampling

1. Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.

Z. TEM

1. Refers to Transmission Electron Microscopy.

AA. Time Weighted Average (TWA)

1. The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

BB. Transite

1. A generic name for asbestos cement wallboard and pipe.

CC.Wetting Agent

1. A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 0.00042 psi.

DD.Worker

1. Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926.1101, to include EPA Model Accreditation Plan (MAP) "Worker" training and accreditation, if required by the OSHA Class of work to be performed or by the state where the work is to be performed. The worker must be appropriately licensed in the State of South Dakota.

EE.VA Professional Industrial Hygienist (VPIH/CIH)

1. The Department of Veterans Affairs Professional Industrial Hygienist who may be a Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Asbestos Abatement Worker and Contractor/Supervisor, and Asbestos Project Designer; and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The VPIH/CIH must be qualified to perform visual inspections as indicated in ASTM E1368. The VPIH/CIH must be appropriately licensed in the State of South Dakota. The VPIH/CIH must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

FF.Representative

1. The VA official responsible for on-going project work.

1.5.REQUIREMENTS

A. Description of Work

1. The work covered by this section includes the handling and control of asbestos-containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos-containing materials generated by the work. More

specific operational procedures must be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. The asbestos work includes the disturbance, demolition, removal, and encapsulation of asbestos-containing materials from the project areas as shown on the hazards abatement drawings which is governed by 40 CFR 763, 40 CFR 61-SUBPART M, 29 CFR 1926.1101, and other state and local standards. Provide negative pressure enclosure techniques as outlined in this specification. The work area will be evacuated prior to the asbestos abatement work. A competent person must supervise asbestos removal work as specified herein.

2. The estimated quantities of asbestos-containing materials to be removed and/or disturbed are shown on the hazards abatement drawings. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents. Refer to the Hazardous Materials Assessment for detailed information on the asbestos-containing materials known or assumed to be present at this site.
3. The work tasks required by this project are summarized briefly as follows:
 - a. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, regulated area preparations, emergency procedures arrangements, and standard operating procedures for asbestos abatement work.
 - b. Abatement activities including removal, encapsulation, and clean-up and disposal of ACM waste, recordkeeping, security, monitoring, and inspections.
 - c. Cleaning and decontamination activities including final visual inspection, air monitoring, and certification of decontamination.

B. Variations in Quantity

1. The estimated quantities are to be considered a baseline for bidding purposes only and are based on limited assessments of materials located within the project work areas which were made accessible to the State-accredited Building Inspector along with additional information made available to the State-accredited Project Designer for use in preparing the hazards abatement drawings and specifications. The Contractor shall satisfy themselves of the actual quantities to be removed and disposed of and to conduct that work in accordance with applicable laws of the authorities having jurisdiction. The Contractor shall document the

locations and quantities of asbestos-containing materials removed each day from each work area. Quantities of asbestos-containing materials must match the units used on the hazards abatement drawings. Where, in the opinion of the Contractor, the use of alternative units is necessary, those alternative units may be used with preapproval from the VA and/or the VA Representative. Minor variations (+/- 10 percent) in the quantities of asbestos-containing materials shown on the hazards abatement drawings are considered as having no impact on contract price and time requirements of this contract. The Contractor must submit unit pricing within their bid for each asbestos-containing material identified on the drawings in case additional quantities of material in excess of the minor variation stated above are required to be removed or disturbed and disposed of in order to accommodate the work. The unit prices submitted by the Contractor are to be used as the cost basis for additional work required under the contract.

2. Prior to starting work in any area, the Contractor must determine the extents of their work area and the work which will take place within that area so that the VPIH may assess the work area for the potential presence of asbestos-containing materials not shown in the contract documents. The VPIH is responsible for inspecting each work area prior to the start of work, and that assessment must include sampling of materials that will be disturbed, or may be contacted by persons performing work, which have not already been identified as asbestos-containing or been shown to be asbestos-free.

C. Stop Asbestos Removal

1. If the VA 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 it is practicable. The Contractor shall not resume any asbestos removal activity until authorized to do so in writing by the VA Representative. A stop asbestos removal order may be issued at any time the VA Representative 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 any applicable time or expense incurred by any of the personnel categories stated in the beginning of this paragraph, as a result of the stop asbestos removal order. The occurrence of any of the following events shall be reported immediately by the Contractor's CP to the VA Representative using the most expeditious means (e.g., verbal or telephonic), followed up with written notification to the VA Representative as soon as practicable. The Contractor shall immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities if:

- a. Airborne PCM analysis results outside of the asbestos regulated work area exceeds 0.01 fibers per cubic centimeter or background whichever is higher.
- b. Breach or break in regulated area containment barrier(s.).
- c. Less than -0.02 inch 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 or inadequate use of wetting agent.
- h. Any visible emissions observed outside the regulated area.
- i. Failure to follow project specification requirements.

D. Medical Requirements

1. Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

E. Medical Examinations

1. Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent state or local directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination must be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."

F. Medical Records

1. Adequate records must show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.1101, and 29 CFR 1926.103. Provide medical surveillance to all personnel exposed to asbestos as indicated in 29 CFR 1926.1101. Maintain complete and accurate medical records of employees for the duration of employment plus 30 years.

G. Employee Training

1. Submit completed Certificate of Worker's Acknowledgment found in Attachment #2 of this section prior to the start of work. Organize certificates by individual worker, not grouped by type of certification. Post appropriate evidence of compliance with the training requirements of 29 CFR 1926.1101, 40 CFR 763, and ARSD Article 74:31. Train personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) training criteria or state training criteria whichever is more stringent. Document the training by providing: dates of training, training entity, course outline, names of instructors, and qualifications of instructors upon request by the VA Representative. Fully cover engineering and other hazard control techniques and procedures. Asbestos workers must have a current State of South Dakota asbestos worker's license.
2. Due to the potential to contact asbestos-containing materials in project areas throughout this site, all personnel performing work at this site are required to have a minimum of "two-hour asbestos awareness training". Only personnel who are trained and State-accredited as an EPA Worker or EPA Contractor/Supervisor are permitted to disturb asbestos-containing materials.
3. Additional training related to health, safety, and environmental issues may be required, and it is the responsibility of the CPIH/CIH to identify those additional issues and to recommend training to the Contractor as necessary to ensure compliance with applicable regulations.

H. Permits and Notifications

1. Prior to the start of work, obtain necessary Permits in conjunction with asbestos removal, encapsulation, hauling, and disposition, and furnish notification of such actions required by federal, state, regional, and local authorities. Notify the Regional Office of the United States Environmental Protection Agency (USEPA) and the VA

Representative in writing 10 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M and ARSD Article 74:36. Note this may include more than one notification and may include trades other than the Asbestos Abatement Contractor. Submit copies of all Notifications to the VA Representative. Submit additional 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.

I. Environment, Safety and Health Compliance

1. In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of federal, state, regional, and local authorities having jurisdiction regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.1101, 40 CFR 61-SUBPART A, 40 CFR 61-SUBPART M, and 40 CFR 763. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements apply. The following regulations found in the Administrative Rules of South Dakota as codified in the South Dakota Codified Laws regarding removal, handling, storing, transporting, and disposing of asbestos materials apply:

- a. ARSD Article 74:27 Solid Waste
- b. ARSD Article 74:28 Hazardous Waste
- c. ARSD Article 74:31 Asbestos Control Program
- d. ARSD Article 74:34 Regulated Substance Discharges
- e. ARSD Article 74:36 Air Pollution Control Program

J. Respiratory Protection Program

1. Establish and implement a respirator program as required by 29 CFR 1926.103, 29 CFR 1926.1101, and 29 CFR 1926.55. Submit respirator program records with a written description of the program to the VA Representative. Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

K. Asbestos Hazard Control Supervisor (CP)

1. The Contractor must be represented on site at all times asbestos work is being performed by a CP with qualifications meeting the criteria of this specification.

L. Hazard Communication Program

1. Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Safety Data Sheets (SDS) for all materials brought to the site.

M. Asbestos Hazard Abatement Plan

1. The Asbestos Hazard Abatement Plan must not be combined with other hazard abatement plans, and must be prepared, signed, and sealed by a State-accredited EPA Project Designer. Provide a Table of Contents for each abatement submittal, which follows the sequence of requirements in the contract. The plan, at a minimum, shall include the proposed means, methods, materials, equipment, and other procedures to be used by the Contractor which must include, but not be limited to, the following elements:
 - a. Notification of other employers and their employees performing work at the site under this contract, building occupants, and other interested parties or as directed by the VA.
 - b. A pre-work sampling plan describing the procedures to be used to identify, sample, and quantify any additional asbestos-containing materials found that will require disturbance.
 - c. Procedures used to identify, execute, and document potential pre-cleaning activities.
 - d. A detailed plan of the safety precautions such as lockout, tagout, tryout, fall protection, and confined space entry procedures and equipment and work procedures to be used during the removal, disturbance, or demolition of materials containing asbestos
 - e. Procedures to ensure the protection of existing work to remain.
 - f. Isolation and protection of life-critical systems and other existing systems.
 - g. Regulated work area setup for each class of asbestos work to be performed.
 - h. Personal protective equipment for each class of asbestos work to be performed.

- i. Asbestos removal procedure(s) for each material being removed or disturbed.
 - j. Expendable materials to be used for asbestos work such as encapsulants, surfactants, poly sheeting, etc.
 - k. Decontamination area setup for each type of regulated work area and/or class of asbestos work to be performed.
 - l. Procedures to ensure negative air pressure is maintained within Negative Pressure Enclosures and corrective actions to be taken in the event of equipment failure or other events which may lead to inadequate negative pressure.
 - m. Procedures for supplying, controlling, treating, and discharging water and wastewater.
 - n. Air monitoring for each type of regulated work area and/or class of asbestos work to be performed.
 - o. Waste packaging, storage, loadout, decontamination, manifesting, transport and disposal.
 - p. Procedures to follow in the event additional quantities of known asbestos-containing materials are encountered.
 - q. Procedures to follow in the event materials are encountered which have not previously been shown to not contain asbestos.
 - r. Current copies of the Project Designer's accreditation.
2. At a minimum, shop drawings must show the following elements:
- a. The locations and extents of each regulated work area.
 - b. Locations of critical barriers.
 - c. Locations of life-critical systems within and/or adjacent to the regulated work area boundaries.
 - d. Location of decontamination area(s).
 - e. Location(s) of negative pressure exhaust routing.
 - f. Location of make-up air entrance(s) into each regulated work area.
 - g. Location(s) of existing equipment to be isolated during the asbestos abatement activities.
 - h. Locations of water supplies and wastewater treatment and discharge area(s).

- i. Locations of air monitoring equipment.
- j. Location(s) of first aid materials.
- k. Location(s) of fire extinguishers.
- l. Emergency egress routes.
- m. Waste loadout route(s).
- n. Location of temporary storage area(s).
- o. The location of copies of all applicable codes, standards, regulations, notices, SDSs, air monitoring results, the Contractor's approved work plan, and other pertinent documents.

N. Testing Laboratory

- 1. Submit the name, address, and telephone number of each testing laboratory selected for the analysis and reporting of airborne concentrations of asbestos fibers along with evidence that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials or transmission electron microscopy is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis. The testing laboratory firm must be independent of the asbestos contractor and must have no employee or employer relationship which could constitute a conflict of interest.

O. Landfill Approval

- 1. Submit written evidence that the landfill is approved for asbestos disposal by the U.S. Environmental Protection Agency, Region 8, local regulatory agencies, and that the Contractor has consulted with the proposed landfill to determine any specific requirements which may be more stringent than those found within this specification, including if pre-authorization is required. Within three working days after delivery, submit detailed delivery tickets, prepared, signed, and dated by an agent of the landfill, certifying the quantities of asbestos materials delivered to the landfill. Submit a copy of the waste shipment records within one day of the shipment leaving the project site.

P. Transporter Certification

1. Submit written evidence that the transporter is approved to transport asbestos waste in accordance with the DOT requirements of 49 CFR 171, 49 CFR 172, and 49 CFR 173 as well as registration requirements of 49 CFR 107 and all other state and local regulatory agency requirements.

Q. Medical Certification

1. Provide a written certification for each worker and supervisor, signed by a licensed physician indicating that the worker and supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103 as prescribed by law. Submit certificates prior to the start of work but after the main abatement submittal.

1.6. EMERGENCY ACTION PLAN AND ARRANGEMENTS

- A. An Emergency Action Plan shall be developed 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 1926.35 Employee Emergency Action Plans.
- 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. For non-life-threatening situations - employees injured or otherwise incapacitated shall be decontaminated following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, medical personnel shall remove

them from the regulated area if back or neck injury is present, 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.

1.7.SUBMITTALS

- A. Submit the following in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES:
 - 1. Emergency Action Plan and Arrangements
 - 2. Affidavit Of Medical Surveillance, Respiratory Protection, And Training Accreditation
 - 3. Contractor/Competent Person(S) Review and Acceptance of The Va's Asbestos Specifications
 - 4. Amended Water
 - 5. Safety Data Sheets (SDS) for All Materials
 - 6. Encapsulants
 - 7. Respirators
 - 8. Local Exhaust Equipment
 - 9. Pressure Differential Automatic Recording Instrument
 - 10. Vacuums
 - 11. Glovebags
 - 12. Safety Data Sheets
 - 13. Air Sampling Results

14. Pressure Differential Recordings for Local Exhaust System
15. Clearance Sampling
16. Asbestos Disposal Quantity Report
17. Clearance Sampling
18. Employee Training
19. Notifications
20. Respiratory Protection Program
21. Asbestos Hazard Abatement Plan
22. Testing Laboratory
23. Landfill Approval
24. Delivery Tickets
25. Waste Shipment Records
26. Transporter Certification
27. Medical Certification
28. Contractor's Professional Industrial Hygienist (CPIH/CIH)
29. Designated Competent Person
30. Worker's License
31. Contractor's License
32. Federal, State or Local Citations on Previous Projects
33. Encapsulants
34. Equipment Used to Contain Airborne Asbestos Fibers
35. Water Filtration Equipment
36. Vacuums
37. Ventilation Systems
38. Certificate Of Compliance
39. Certificate Of Worker's Acknowledgement
40. Water Filtration Equipment
41. Certificate Of Completion
42. Permits
43. Notifications

44. Respirator Program Records

45. Rental Equipment

1.8.QUALITY ASSURANCE

A. General

1. Administrative and supervisory personnel shall, at a minimum, consist of the Contractor's approved CP, the accredited Project Designer, and the Contractor's Professional Industrial Hygienist. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements. 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.
2. Comply with laws, ordinances, rules, and regulations of federal, state, and local authorities having jurisdiction regarding removing, handling, storing, transporting, and disposing asbestos-containing waste materials. Comply with applicable requirements of 29 CFR Part 1926.1101, and notify the VA Representative and request resolution of conflicts between regulations and specified requirements before starting work.
3. Submit a completed Certificate of Worker's Acknowledgement found in Attachment #2 of this section, a completed Affidavit of Medical Surveillance, Respiratory Protection, and Training Accreditation found in Attachment #3 of this section, and the Contractor/Competent Person(s) Review and Acceptance of the VA's Asbestos Specifications found in Attachment #4 of this section.

B. Responsibilities

1. 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. Coordinate utilities use, locations, and other conditions of use with the Contractor.
2. Asbestos Abatement Contractor Responsibility
 - a. The Asbestos Abatement Contractor (Contractor) shall assume primary responsibility and liability for compliance with all applicable federal, state, and local regulations related to all aspects of the asbestos

abatement work. The General Contractor shall assume secondary responsibility and liability for their own and their other sub-contractor's compliance with all applicable federal, state, and local regulations as it relates to potential asbestos disturbance. The Contractor is responsible for providing and maintaining required documentation including but not limited to training, accreditations, medical exams, medical records, personal protective equipment (PPE), respiratory protection, and 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 regulations or contract requirements on the part of themselves, their employees, or their subcontractors.

C. Contractors Use of Premises

1. The Contractor and Contractor's personnel shall cooperate fully with the VA representative 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.
2. 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. Contractor's Professional Industrial Hygienist (CPIH/CIH)

1. Submit the name, address, and telephone number of the Contractor's Professional Industrial Hygienist (CPIH/CIH) selected to direct monitoring and training, and documented evidence that the CPIH/CIH has successfully completed training in and is accredited as a Building Inspector and Contractor/Supervisor Abatement Worker as described by 40 CFR 763 and Article 74:31 and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The CPIH/CIH shall have at least 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 specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; and has appropriate medical/respiratory

protection records/documentation. The CPIH/CIH and the Contractor and/or their subcontractors must not have an employee/employer relationship or financial relationship which could constitute a conflict of interest. The CPIH/CIH must be a first-tier subcontractor.

E. Designated Competent Person Documentation

1. The Designated Competent Person must be experienced in the administration and supervision of asbestos abatement projects including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, notification of other employees onsite, and has at least 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. The Designated Competent Person must be on-site at all times when asbestos abatement activities are underway. Submit training certification and a current State of South Dakota Asbestos Contractor's and Supervisor's License. The Designated Competent Person must be a first-tier subcontractor.

F. Worker's License

1. Submit documentation that workers meet the requirements of 29 CFR 1926.1101, 40 CFR 61-SUBPART M, have a current State of South Dakota Asbestos Workers License, and have training on the standard operating procedures of the Contractor. Submit a completed Certificate of Completion found in Attachment #1 of this section prior to the start of work.
2. Submit 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.

G. Contractor's License

1. Submit a copy of the asbestos contractor's license issued by the State of South Dakota and a copy of their 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. Submit a completed Certificate of Worker's Acknowledgement found in Attachment #2 of this section, a completed Affidavit of Medical Surveillance, Respiratory Protection, and Training Accreditation found in Attachment #3 of this section, and the Contractor/Competent Person(s) Review and Acceptance of the VA's Asbestos Specifications. Submit project experience within the past 3 years, listing projects first most similar to this project and include the: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; and Completion Date. Submit evidence that the Contractor has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; and has adequate materials, equipment, and supplies to perform the work.

H. Air Sampling Results

1. The Contractor and/or the CPIH/CIH must complete fiber counting and provide results to the VPIH/CIH and the VA Representative for review within 16 hours of the "time off" of the sample pump. Notify the VA Representative immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the VPIH/CIH, the VA Representative, and the affected Contractor employees where required by law within three working days, signed by the CPIH/CIH who performed the air sampling, the employee that analyzed the sample, and the Contractor. Notify the Contractor and the VA Representative immediately of any variance in the pressure differential which could cause asbestos fibers to migrate into adjacent unsealed areas. Under no circumstance may asbestos concentrations outside of the asbestos regulated work area exceed 0.01 fibers per cubic centimeter or background whichever is higher.

I. Pressure Differential Recordings for Local Exhaust System

1. Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external to the enclosure and operate it continuously, 24-hours a day, until the temporary enclosure of the asbestos control area is removed. Submit pressure differential recordings for each workday to the CP and CPIH/CIH for review and to the VPIH/CIH and the VA Representative 24-hours from the end of each workday.

J. Federal, State or Local Citations on Previous Projects

1. Submit a statement, signed by an officer of the company, containing a record of any citations, notices of violations, penalties issued by federal, state or local regulatory agencies relating to asbestos activities within the last 5 years (including projects, dates, and resolutions) and any legal actions taken against the company including the company's officers (including damages paid); a list of penalties incurred through non-compliance with asbestos project specifications, including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated (including projects, dates, and reasons for terminations). If there are none, a negative declaration signed by an officer of the company must be provided.

K. Preconstruction Conference

1. After the pre-construction submittals have been reviewed and approved, a pre-construction meeting shall be held with the following parties in attendance at a minimum: the General Contractor, the Asbestos Abatement Sub-Contractor and their Competent Person(s), other interested sub-contractors, the Contractor's Professional Industrial Hygienist (CPIH/CIH), and the VA Certified Industrial Hygienist (VPIH/CIH), and the VA Representative. The goals of the pre-construction meeting are to discuss the planned scope, phasing, and overall coordination and execution of the asbestos abatement work; to verify that the approved pre-construction submittals are still valid; to identify any potential issues with the project scope, timing, or planning as it relates to the asbestos abatement scope of work, and to ensure agreement among the parties prior to commencing work. The pre-construction meeting minutes and sign in sheet must be submitted to the VA Representative within 5 days after the completion of the pre-construction meeting.
2. No work shall commence until the pre-construction submittals have been approved, a pre-construction meeting held, and a written authorization to proceed with the work is provided by the VA Professional Industrial Hygienist (VPIH/CIH) and the VA Representative.

1.9. 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 and demarcated as an asbestos regulated work area to prevent entry to or exit from the regulated area unless in the event of an emergency. 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 shall be informed of asbestos abatement regulated areas to provide security checks during facility rounds and emergency response.

1.10. EQUIPMENT

A. Rental Equipment

1. Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

1.11. WARRANTY

- #### **A. Construction Warranty: FAR clause 52.246 21, "Warranty of Construction."**

PART 2 - PRODUCTS

2.1. GENERAL

- #### **A. 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 including, but not limited to:**
1. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
 2. 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.
 3. 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.
 4. Polyethylene sheeting for walls in the regulated area shall be a minimum of 4-mils. 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.
 5. 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, poly tape, furring strips, spray glue, staples, nails, screws, lumber, and plywood for enclosures or approved equivalent procedures capable of sealing polyethylene to dissimilar finished or unfinished surfaces under both wet and dry conditions.

6. Polyethylene sheeting utilized for the PDF shall be opaque white or black in color, 6-mil fire-retardant poly.
7. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and wastewater filtration system shall be provided by the Contractor.
8. 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.
9. 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).
10. 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.
11. Chlorinated compounds shall not be used with any spray adhesive, mastic remover or other product. Appropriate encapsulant(s) shall be provided.
12. 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.
13. 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).

2.2. ENCAPSULANTS

- A. Encapsulants must conform to current USEPA requirements, contain no toxic or hazardous substances as defined in 29 CFR 1926.59, and conform to the following performance requirements. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants and application instructions.
- B. Certificate of compliance: The Contractor shall submit to the VA representative certification from the manufacturer indicating

compliance with performance requirements for encapsulants when applied according to manufacturer recommendations.

C. Removal Encapsulants

1. All encapsulants must meet the performance requirements of the University of Pittsburgh Protocol: Combustion Toxicity; zero mortality.

D. Bridging Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible effect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb.	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

E. Penetrating Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible effect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119

Requirement	Test Standard
Impact Resistance - Minimum 43 in/lb.	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

F. Lock-down Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Cohesion/Adhesion Test - 50 pounds of force/foot	ASTM E119
Fire Resistance - Negligible effect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb.	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

- G. In certain situations, encapsulants may have to be applied to hot pipes/equipment. The encapsulants must be able to withstand high temperatures without cracking or creating any noxious gaseous or vapors during or after application.

2.3.DUCT TAPE

- A. Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container.

2.4.DISPOSAL CONTAINERS

- A. Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers must be provided for

ACM wastes as required by 29 CFR 1926.1101. Disposal containers can be in the form of:

1. Disposal Bags
2. Fiberboard Drums
3. Cardboard Boxes
4. Disposal Bags
5. Fiberboard Drums
6. Cardboard Boxes

2.5.SHEET PLASTIC

A. Sheet plastic must be polyethylene of 6 mil minimum thickness and must be provided in the largest sheet size necessary to minimize seams. Film must be clear, frosted, or black and conform to ASTM D4397, except as specified below.

1. Flame Resistant
 - a. Where a potential for fire exists, flame-resistant sheets must be provided. Film must be frosted or black and must conform to the requirements of NFPA 701 and as specified in this section.
2. Reinforced
 - a. Reinforced sheets must be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock must consist of translucent, nylon-reinforced, or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film must meet flame resistant standards of NFPA 701.

2.6.MASTIC REMOVING SOLVENT

A. Mastic removing solvent must be compatible with replacement materials, must be nonflammable, and must not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite must have a flash point greater than 140 degrees F.

2.7.LEAK-TIGHT WRAPPING

A. Two layers of 6 mil minimum thick polyethylene sheet stock must be used for the containment of removed asbestos-containing components or materials such as large tanks, boilers, insulated pipe segments, and other materials. Upon placement of the ACM component or material, each layer must be individually leak-tight sealed with duct tape.

2.8.VIEWING INSPECTION WINDOW

- A. Where feasible, a minimum of one clear, 1/8-inch thick, acrylic sheet, 18 by 24 inches, must be installed as a viewing inspection window at eye level on a wall in each containment enclosure. The windows must be sealed leak-tight with industrial grade duct tape.

2.9.WETTING AGENTS

- A. Removal encapsulant (a penetrating encapsulant) must be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant must be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS above.

2.10. WATER FILTRATION EQUIPMENT

- A. Submit performance data for the Contractor's proposed water filtration equipment meeting the requirements of this section.

2.11. SAFETY DATA SHEETS

- A. Submit Safety Data Sheets (SDS) as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication in the pre-construction meeting submittals.

PART 3 - EXECUTION

3.1.GENERAL

- A. No work shall commence until the pre-construction submittals have been approved, a pre-construction meeting held, the pre-work inspections have been completed, and a written authorization to proceed with the work is provided by the VA Professional Industrial Hygienist (VPIH/CIH).
- B. The Contractor must perform the following pre-abatement inspections and preparations prior to the construction of the regulated area:
 - 1. With the assistance of the VA Representative, determine if there are any special or unique conditions within the work area, such as controls or equipment which may require access during the abatement by non-abatement personnel, that may necessitate a modification to work area setups contained in the Contractor's approved Asbestos Hazard Abatement Plan. If modifications are required, provide details of the proposed modification to the VA and/or their representative for review and approval.

2. Conduct a space-by-space inspection with an authorized VA representative and prepare a written inventory of all existing damage in those spaces where asbestos abatement will occur. Still or video photography may be used to supplement the written damage inventory. Document will be signed and certified as accurate by both parties.
3. Determine the extents of each individual work area and the work to be performed within those areas, and prepare a sketch or other document which will sufficiently communicate the work area extents and planned work to the VPIH/CIH. Conduct a space-by-space inspection with the VPIH/CIH to verify the extents of the work areas, the planned work, and what materials may be contacted or disturbed by the work so that those materials may be sampled prior to being disturbed.
4. Verify the conditions that are presented in the hazards abatement design drawings and specifications.

3.2.EQUIPMENT

- A. Provide the VA Representative and/or the VPIH/CIH with at least two complete sets of personal protective equipment as required for entry to and inspection of the asbestos control area. Provide equivalent training to the VA Representative and/or the VPIH/CIH as provided to Contractor's employees in the use of the required personal protective equipment. Provide manufacturer's certificate of compliance for all equipment used to contain airborne asbestos fibers.
- B. Air Monitoring Equipment
 1. The CPIH/CIH must provide and approve air monitoring equipment. The equipment must include, but must not be limited to:
 - a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute.
 - b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps must also be equipped with an automatic flow control unit which must maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.
 - c. Single use standard 25 mm diameter cassette, open face, 0.8-micron pore size, mixed cellulose ester membrane

filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands for personal air sampling.

- d. Single use standard 25 mm diameter cassette, open face, 0.45-micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive cowl, and shrink bands when conducting environmental area sampling using NIOSH NMAM Methods 7400 and 7402, (and the transmission electric microscopy method specified at 40 CFR 763 if required).
- e. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

C. Respirators

- 1. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.
- 2. Respirators for Handling Asbestos
 - a. Provide personnel engaged in pre-cleaning, cleanup, handling, removal, disturbance, or demolition of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103. Breathing air must comply with CGA G-7.

D. Exterior Whole-Body Protection

- 1. Outer Protective Clothing
 - a. Provide personnel exposed to asbestos with disposable whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort but must not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape.
- 2. Work Clothing
 - a. Provide cloth work clothes for wear under the outer protective clothing and foot coverings and either dispose of or properly decontaminate them as recommended by the CPIH/CIH after each use.

3. Eye Protection

- a. Provide eye protection that complies with ANSI/ISEA Z87.1 when operations present a potential eye injury hazard. Provide goggles to personnel engaged in asbestos abatement operations when the use of a full-face respirator is not required.

E. DECONTAMINATION FACILITIES

1. General

- a. Provide each regulated area with separate personnel decontamination facilities (PDF) and waste/equipment decontamination facilities (W/EDF). 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 W/EDF.
- b. All personnel entering or exiting a regulated area must go through the PDF and shall follow the requirements at 29 CFR 1926.1101 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 or approved equivalent 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.
- c. The Competent Person shall, with the assistance of the VA who will provide a water source for the Contractor's use, provide temporary water service connections to the PDF and W/EDF as coordinated with the VA representative. 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 1926.1101. 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 degrees F throughout the PDF and W/EDF.

2. Personnel Decontamination Facility (PDF)

- a. 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 ensure 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 and must conform to the following requirements:
 - i. 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 airtight room. Provide a minimum of 2 - 900 mm (3 foot) wide 6-mil poly opaque fire-retardant doorways. The floor of the clean room shall be maintained in a clean, dry, and sanitary 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. Male/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/female can enter or exit the PDF during his/her stay in the PDF.
 - ii. Shower Room: The Competent Person shall assure that the shower room is a completely watertight 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 airtight 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. Wastewater 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.

iii. Equipment Room: The Competent Person shall provide an equipment room which shall be an airtight 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 Competent Person shall ensure that most gross contamination is removed from the outside of PPE, suits, and respirators in the regulated work area, prior to entering the Equipment Room. 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 airtight 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.

iv. 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.

3. Waste/Equipment Decontamination Facility (W/EDF)

- a. The Competent Person shall provide a decontamination facility W/EDF consisting of a washroom, 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:
 - i. Wash Down Station: Provide an enclosed shower unit in the regulated area just outside the washroom as an equipment bag and container cleaning station.
 - ii. Washroom: Provide a washroom for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the washroom using 50 x 100 mm (2 inches x 4 inches) wood framing or approved equivalent and 3 layers of 6-mil fire-retardant poly. Locate the washroom so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the washroom shall be constructed of 2 layers of 6-mil fire-retardant poly.
 - iii. Holding Room: Provide a holding room as a drop location for bagged materials passed from the washroom. Construct the holding room using 50 x 100 mm (2 inches x 4 inches) wood framing or approved equivalent and 3 layers of 6-mil fire-retardant poly. The holding room shall be located so that bagged material cannot be passed from the washroom 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.
 - iv. Clean Room: Provide a clean room to isolate the holding room from the exterior of the regulated area. Construct the clean room using 2 inches x 4 inches wood framing or approved equivalent 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.

- v. The W/EDF shall be as follows: Washroom leading to a Holding Room followed by a Clean Room leading to outside the regulated area.

4. Waste/Equipment Decontamination Procedures

- a. At the washdown station in the regulated area, thoroughly wet clean contaminated equipment and/or sealed polyethylene bags and pass into washroom after visual inspection. When passing anything into the washroom, close all doorways of the W/EDF, other than the doorway between the washdown station and the washroom. Keep all outside personnel clear of the W/EDF. Once inside the washroom, 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. At no time shall personnel from the clean side be allowed to enter the washroom.

F. Regulated Areas

- 1. All Class I, II, and III asbestos work must be conducted within regulated areas. The regulated area must be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

G. Signage and Power Management

- 1. Provide warning signs at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Signs must comply with the requirements of 29 CFR 1926.1101. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to the requirements are acceptable.
- 2. Maintain two (2) copies of all standards, regulations, codes, and other applicable documents, including those publications referenced by this specification. Post one copy

of each in the clean room at the regulated area where workers will have daily access to the regulations and keep another hard copy or electronic copy in the Contractor's office.

3. Shut down and lock out/tag out electric power to the regulated area and provide temporary power and lighting in accordance with all applicable electrical code and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.
4. 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. Provide an air-tight seal consisting of a minimum of 2 layers of independently installed 6-mil poly at all intake and exhaust vents in the regulated area. Also, seal any seams in system components that pass through the regulated area.

H. Local Exhaust System

1. Provide a local exhaust system in the asbestos control area in accordance with ASSP Z9.2 and 29 CFR 1926.1101 that will provide at least four air changes per hour inside of the negative pressure enclosure. Local exhaust equipment must be operated 24-hours per day, until the asbestos control area is removed and must be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the control area of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. The building ventilation system must not be used as the local exhaust system for the asbestos control area. Filters on exhaust equipment must conform to ASSP Z9.2 and UL 586. Terminate the local exhaust system out of doors a minimum of 30 feet from building make-up air, doors, open windows, patients, visitors, and staff unless the VA Representative allows an alternate arrangement.

I. Tools

1. Vacuums must be leak proof to the filter and equipped with HEPA filters. Filters on vacuums must conform to ASSP Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse. Reusable tools must be

thoroughly decontaminated prior to being removed from the regulated areas.

J. Rental Equipment

1. If rental equipment is to be used, furnish written notification to the rental agency concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

K. Glovebags

1. Submit written manufacturers proof that glovebags will not break down under expected temperatures and conditions.

3.3.WORK PROCEDURE

- A. Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, and as specified herein. Use wet removal procedures, appropriate encapsulation procedures as listed in the asbestos hazard abatement plan, and negative pressure enclosure techniques. Wear and utilize protective clothing and equipment as specified herein. No eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics is permitted in the asbestos work or control areas. Personnel of other trades not engaged in the removal, demolition, or encapsulation of asbestos-containing material must not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this specification are complied with by the trade personnel. Seal all roof top penetrations, except plumbing vents, prior to asbestos roofing work. Shut down the building heating, ventilating, and air conditioning system, cap the openings to the system, and provide temporary heating, ventilation, and air conditioning prior to the commencement of asbestos work. Power to the regulated area must be locked-out and tagged in accordance with 29 CFR 1910.147. Disconnect electrical service when encapsulation or wet removal is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFCI) protection prior to the use of any water or encapsulant. All electrical work must be performed by a licensed electrician.

B. Building Ventilation System and Critical Barriers

1. Building ventilation system ducts in a regulated area must be shut down and isolated by lockable switch or other positive means in accordance with 29 CFR 1910.147. The ducts and any other penetrations located within the work area must be isolated by airtight seals to prevent the spread of contamination throughout the system. The airtight seals must consist of air-tight rigid covers for building ventilation supply and exhaust grills where the ventilation

system is required to remain in service during abatement. Edges to wall, ceiling and floor surfaces must be sealed with industrial grade duct tape.

- a. A Competent Person must supervise the work.
- b. For indoor work, critical barriers must be placed over all openings to the regulated area.
- c. Impermeable dropcloths must be placed on surfaces beneath all removal activity.

C. Protection of Existing Work to Remain

1. Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the VA Representative using visual inspection or sample analysis, it must be restored to its original condition or decontaminated by the Contractor at no expense to the VA as deemed appropriate by the VA Representative. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the CPIH/CIH work may proceed after written authorization from the VA Representative.

D. Furnishings

1. The VA will remove furniture and equipment from the work areas before asbestos work begins.
2. Fixed furniture and equipment will remain in the building. Protect, cover, and seal furnishings with 6-mil plastic sheet prior to the start of work.

E. Pre-cleaning and Pre-work Inspection Activities

1. There is no requirement to remove pre-existing asbestos-containing dusts or debris from the facility unless Contractor determines that to be a more cost-effective means of completing the work.
2. All work areas must be assessed by the VPIH to determine what additional sampling may be required prior to the disturbance of any materials which have not been previously shown to contain asbestos or to not contain asbestos. The minimum bulk sampling requirements for each homogeneous area of material are:

a. Surfacing materials:

- i. At least three (3) bulk samples shall be collected from each homogeneous area that is 1,000 square feet or less.
- ii. At least five (5) bulk samples shall be collected from each homogeneous area that is greater than 1,000 square feet but less than or equal to 5,000 square feet.
- iii. At least seven (7) bulk samples shall be collected from each homogeneous area that is greater than 5,000 square feet.
- iv. At least one (1) additional bulk sample for every additional 1,000 square feet of material.

b. Thermal System Insulation (TSI):

- i. At least three (3) bulk samples shall be collected from each homogeneous area of TSI.
- ii. At least one (1) bulk sample from each homogeneous area of patched thermal system insulation if the patched section is less than 6 linear or square feet.
- iii. In a manner sufficient to determine, which must include at least two (2) bulk samples, from each insulated mechanical system where cement or plaster is used on fittings such as tees, elbows, or valves.
- iv. Bulk samples are not required to be collected from any homogeneous area where the accredited inspector has determined that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM.

c. Miscellaneous materials:

- i. At least two (2) bulk samples shall be collected from each homogeneous area that is less than 500 square feet.
- ii. At least three (3) bulk samples shall be collected from each homogeneous area that is greater than or equal to 500 square feet but less than 1,000 square feet.
- iii. At least five (5) bulk samples shall be collected from each homogeneous area that is greater than 1,000 square feet but less than or equal to 5,000 square feet.

- iv. At least seven (7) bulk samples shall be collected from each homogeneous area that is greater than 5,000 square feet.
 - v. At least one (1) additional bulk sample for every additional 1,000 square feet of material.
3. Once the assessment has been completed and the extent of the asbestos abatement work verified, the work may proceed.
 4. Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area.
 5. Pre-clean all movable objects within the regulated area using a HEPA filtered vacuum and/or wet cleaning methods as appropriate. After cleaning, these objects shall be removed from the regulated area and carefully stored in an uncontaminated location. Drapes, clothing, upholstered furniture, and other fabric items shall be disposed of as asbestos contaminated waste.
 6. Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate.
 7. After pre-cleaning, enclose fixed objects with a minimum of 2 layers of 6-mil poly and seal securely in place with duct tape. Objects (e.g., permanent fixtures, shelves, electronic equipment, laboratory tables, sprinklers, alarm systems, closed circuit TV equipment and computer cables) which must remain in the regulated area and that require special ventilation or enclosure requirements should be designated along with specified means of protection. Contact the manufacturer for special protection requirements.
 8. Pre-clean all surfaces in the regulated area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Do not use any methods that would raise dust such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not disturb asbestos-containing materials during this pre-cleaning phase.
 9. All workers performing pre-cleaning activities must don personal protective equipment (PPE) in accordance with 29 CFR 1926.1101 for asbestos, and other pertinent OSHA regulations should additional hazards be identified.

F. Firestopping

1. Identify all fire barrier penetrations due to abatement work and provide firestopping as specified in Section 07 84 00 FIRESTOPPING.

2. 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.
3. 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.

G. Asbestos Control Area Requirements

1. Negative Pressure Enclosure

- a. Unless pre-authorized by the VA's Representative, all asbestos abatement work shall be conducted within a Negative Pressure Enclosure meeting the specifications of 29 CFR 1926.1101.
- b. HEPA equipped negative air machines shall be discharged outside of the building a minimum of 30 feet from building make-up air, doors, open windows, patients, visitors, and staff.
- c. Provide standby units in the event of machine failure and/or emergency in an adjacent area.
- d. The fully operational negative air system within the regulated area shall continuously maintain a pressure differential at least -0.02-inch WCG inside the regulated work area.
- e. 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-inch WCG pressure differential inside the regulated work area for the duration of the project.
- f. 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 percent of the negative air machines in operation.
- g. 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.

- h. The Negative Pressure Enclosure 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.
- i. The demonstration of the operation of the negative pressure system to the VA shall include, but not be limited to, the following:
 - i. Plastic barriers and sheeting move lightly in toward the regulated area.
 - ii. Curtains of the decontamination units move in toward regulated area.
 - iii. 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.
 - iv. Use smoke tubes to demonstrate air is moving across all areas in which work is to be done.
 - v. Use a differential pressure gauge to indicate a negative pressure of > -0.02 -inch WCG across every barrier separating the regulated area from the rest of the building. Modify the system as necessary to meet the above requirements.
- j. Use of the Negative Pressure Filtration System During Abatement Operations:
 - i. Start units before beginning any disturbance of ACM occurs.
 - ii. The negative air machines shall continue to run for the duration of the work until a final visual clearance and a final air clearance has been successfully completed for that regulated area.

- iii. No negative air units shall be shut down at any time unless authorized by the VA Contracting Officer, verbally and in writing.

k. Dismantling The System:

- i. After completion of the final visual and final air clearance has been obtained by the VPIH/CIH, the negative air units may be shut down. The exterior surfaces of the negative air units shall have been completely decontaminated; pre-filters are not to be removed and the unit's inlet/outlet sealed using a minimum of 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 labels shall be attached to the units.

2. Containment Barriers and Coverings in the Regulated Area

- a. Seal off the perimeter of 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, Contractor shall immediately stop work and clean up the contamination at no additional cost to the VA.

b. Preparation Prior To Sealing:

- i. 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 not scheduled for removal remaining in the regulated area shall be completely covered using a minimum of 2 layers of 6-mil fire-retardant poly sheeting and secured with duct tape.
- ii. 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.

c. Critical Barriers:

- i. Completely separate any operations in the regulated area from adjacent areas using a minimum of 2 layers

of 6-mil fire-retardant poly and duct tape. Individually seal all HVAC openings into the regulated area using a minimum of 2 layers of 6-mil poly and duct tape. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects/openings in the regulated area.

d. Primary Barriers must include:

- i. Cover the regulated area with a minimum of two layers of 6-mil fire-retardant poly on the floors and a minimum of 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 inches). Seams must overlap at least 1800 mm (6 feet) and must be spray glued and taped. Install sheeting so that layers can be removed independently from each other. Carpeting shall be covered with a minimum of three layers of 6-mil poly. Corrugated cardboard sheets or other approved material must be placed between the bottom and middle layers of poly. Mechanically support and seal with duct tape and glue all wall layers.
- ii. If stairs and ramps are covered with 6-mil plastic, a minimum of two layers must be used. Provide 19 mm (3/4 inch) exterior grade plywood treads held in place with duct tape/glue on the plastic. Do not cover rungs or rails with any isolation materials.

e. Secondary Barrier and Walkways must include:

- i. Install as a drop cloth a 6-mil poly sheet at the beginning of each work shift where removal is to be done during that shift. Completely cover floors and any walls within 10 feet (3 meters) of the area where work is to be performed. Secure the secondary barrier with duct tape to prevent it from moving or debris from getting behind it. Remove the secondary barrier at the end of the shift or as work in the area is completed. Keep residue on the secondary barrier wetted. When removing, fold inward to prevent spillage and place in a disposal bag.
- ii. Install walkways using 6-mil black poly between the regulated area and the decontamination facilities (PDF and W/EDF) to protect the primary layers from contamination and damage. Install the walkways at the beginning of each shift and remove at the end of each shift.

f. Extension of the Regulated Area:

- i. 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.

3. Glovebag

- a. If the construction of a negative pressure enclosure is infeasible, or if the work meets the definition of "Small-Scale Short-Duration" in 40 CFR 763, the use of alternate techniques as indicated in 29 CFR 1926.1101 is allowed with prior written approval from the VA Representative. Establish designated limits for the asbestos regulated area with the use of rope or other continuous barriers and maintain all other requirements for asbestos control areas. The CPIH/CIH must conduct personal samples of each worker engaged in asbestos handling (removal, disposal, transport, and other associated work) throughout the duration of the project. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers at any time exceeds background or 0.01 fibers per cubic centimeter whichever is greater, stop work, evacuate personnel in adjacent areas or provide personnel with approved protective equipment at the discretion of the VA Representative. This sampling may be duplicated by the VA at the discretion of the VA Representative. If the air sampling results obtained by the VA Representative differ from those obtained by the Contractor, the VA Representative will determine which results predominate. If adjacent areas are contaminated as determined by the VPIH/CIH or the VA Representative, clean the contaminated areas, monitor, and visually inspect the area as specified herein.

4. Alternative Regulated Area Configuration

- a. At the discretion of the VPIH/CIH and the VA Representative, alternative regulated area configurations may be allowed. Under most circumstances, these alternative configurations would include the following minimum requirements: establish designated limits for the asbestos regulated work area with the use of red barrier tape; install critical barriers, splash guards and signs; and maintain all other requirements for asbestos control areas except local exhaust ventilation unless feasible. Place impermeable dropcloths on surfaces beneath removal

activity extending out 3 feet in all directions. A detached decontamination system may be used.

H. Removal Procedures

1. Removal of asbestos-containing materials shall be performed in accordance with 29 CFR 1926.1101, the Contractor's approved Asbestos Hazards Abatement Plan, and this specification.

I. Methods of Compliance

1. Mandated Practices

- a. The specific abatement techniques and items identified must be detailed in the Contractor's AHAP. Use the following engineering controls and work practices in all operations, regardless of the levels of exposure:
 - i. Vacuum cleaners equipped with HEPA filters.
 - ii. Wet methods or wetting agents except where it can be demonstrated that the use of wet methods is unfeasible due to the creation of electrical hazards, equipment malfunction, and in roofing.
 - iii. Prompt clean-up and disposal.
 - iv. Inspection and repair of polyethylene.
 - v. Cleaning of equipment and surfaces of containers prior to removing them from the equipment room or area.

2. Control Methods

- a. Use the following control methods:
 - i. Local exhaust ventilation equipped with HEPA filter.
 - ii. Enclosure or isolation of processes producing asbestos dust.
 - iii. Where the feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PELs, use them to reduce employee exposure to the lowest levels attainable and must supplement them by the use of respiratory protection.

3. Unacceptable Practices

a. The following work practices must not be used:

- i. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.
- ii. Compressed air used to remove asbestos containing materials, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
- iii. Dry sweeping, shoveling, or other dry clean up.
- iv. Employee rotation as a means of reducing employee exposure to asbestos.

J. Glovebag/Glovebox Systems

1. Where used, glovebags must be used without modification, smoke-tested for leaks, and completely cover the circumference of pipe or other structures where the work is to be done. Glovebags must be used only once and must not be moved. Glovebags must not be used on surfaces that have temperatures exceeding 150 degrees F. Prior to disposal, glovebags must be collapsed using a HEPA vacuum. Before beginning the operation, loose and friable material adjacent to the glovebag operation must be wrapped and sealed in 2 layers of plastic or otherwise rendered intact. At least two persons must perform glovebag removal. Asbestos regulated work areas must be established for glovebag abatement. Designated boundary limits for the asbestos work must be established with rope or other continuous barriers and all other requirements for asbestos control areas must be maintained, including area signage and boundary warning tape.
2. Attach HEPA vacuum systems to the bag to prevent collapse during removal of ACM.
3. The negative pressure glovebag/glovebox must be fitted with gloved apertures and a bagging outlet and constructed with rigid sides from metal or other material which can withstand the weight of the ACM and water used during removal. A negative pressure must be created in the system using a HEPA filtration system. The box must be smoke tested for leaks prior to each use.

K. Mini-Enclosure

1. Mini-containment (small walk-in enclosure) to accommodate no more than two persons may be used at the discretion of the

VPIH/CIH and the VA Representative if the disturbance or removal can be completely contained by the enclosure. The mini-enclosure must be inspected for leaks and smoke tested before each use. Air movement must be directed away from the employee's breathing zone within the mini-enclosure.

L. Wrap and Cut Operation

1. Prior to cutting pipe, the asbestos-containing insulation must be wrapped with polyethylene and securely sealed with duct tape to prevent asbestos becoming airborne as a result of the cutting process. The following steps must be taken: install glovebag, strip back sections to be cut 6 inches from point of cut, and cut pipe into manageable sections.

M. Encapsulation Procedures

1. General

- a. At the conclusion of ACM removal and before removal of the primary barriers, the contractor shall encapsulate all surfaces with a bridging encapsulant.

2. Delivery and Storage

- a. Deliver materials to the job site in original, new, and unopened containers bearing the manufacturer's name and label as well as the following information: name of material, manufacturer's stock number, date of manufacture, thinning instructions, application instructions and the SDS for the material.

3. Worker Protection

- a. Before beginning work with any material for which an SDS has been submitted, provide workers with any required personal protective equipment. The required personal protective equipment shall be used whenever exposure to the material might occur. In addition to OSHA/specification requirements for respiratory protection, a paint pre-filter and an organic vapor cartridge, at a minimum, shall be used in addition to the HEPA filter when an organic solvent based encapsulant or other solvent is used. The CPIH/CIH shall be responsible for provision of adequate respiratory protection. Note: Flammable and combustible encapsulants or solvents shall not be used, unless authorized in writing by the VA.

4. Lockdown Encapsulation

- a. Lockdown Encapsulation of Abated Surfaces: With the express written permission of the VA's representative, perform lockdown encapsulation of all surfaces from which asbestos was abated in accordance with the procedures in

this specification. Negative pressure shall be maintained in the regulated area during the lockdown application.

- b. Apply two coats of lockdown encapsulant to scratch coat plaster or piping after all ACM has been removed. Apply the first coat while the scratch coat is still damp from the asbestos removal process, after passing the visual inspection. If the surface has been allowed to dry, wet wipe or HEPA vacuum prior to spraying with encapsulant. Apply a second coat over the first coat in strict conformance with the manufacturer's instructions. Any deviation from the instructions must be approved by the VA's representative in writing prior to commencing the work.
- c. Color the lockdown encapsulant and contrast the color in the second coat so that visual confirmation of completeness and uniform coverage of each coat is possible. Adhere to the manufacturer's instructions for coloring. At the completion of the encapsulation, the surface must be a uniform third color produced by the mixture unless the area being encapsulated will not be accessible or visible to building occupants during normal facility operations.

5. Bridging Encapsulant

- a. Seal edges of ACM exposed by removal work with two coats of bridging encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the bridging encapsulant. Apply as recommended by the manufacturer.

N. Air Sampling

- 1. 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 final clearance monitoring and visual inspections and may perform other support services at the discretion of the VA Representative 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 as specified, 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

visual inspections and/or clearance monitoring that may be required due to unsatisfactory initial results. Any repeated final visual inspections and/or clearance monitoring, if required, shall be borne by the Contractor.

2. If laboratory analysis of samples collected during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed 0.01 f/cc above background levels, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples using NIOSH TEM Method 7402. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results shall be borne by the Contractor for both the collection and analysis of samples and for any associated time delay that may occur as a result.
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.
4. The person performing the personnel and area air monitoring inside and outside the regulated area shall be the CPIH/CIH and/or an IH Technician who is under the direct supervision of the CPIH/CIH. The IH Technician shall meet the minimum qualifications of the CPIH/IH, however, the IH Technician need not meet the minimum experience requirements of the CPIH/CIH.
5. Provide area air sampling and establish the baseline one day prior to the masking and sealing operations for each asbestos removal, demolition, or encapsulation site. Establish the background by performing area sampling in similar but uncontaminated sites in the building.
6. The analytical laboratory used by the Contractor to analyze the samples shall be approved by the VA prior to start of the project. A daily log shall be maintained by the CPIH/CIH or IH Technician. This log shall be made available to the VA representative and/or 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 task in accordance with 29 CFR 1926.1101. Air monitoring shall be conducted for the duration of the project while asbestos abatement work is being performed in accordance with the following minimum requirements:

- a. No fewer than two (2) personal air samples or 25 percent of representative workforce per shift shall be collected, whichever is greater, in each regulated area.
 - b. A minimum of three (3) air samples from within the regulated area boundaries.
 - c. A minimum of three (3) area air samples at locations inside the building but immediately outside the regulated work area.
 - d. One (1) area air sample shall be collected daily in the Clean Room of the PDF.
 - e. One (1) area air sample shall be collected daily at the approximate location of HEPA exhaust discharge.
 - f. One (1) sample taken in the waste loadout area during waste loadout operations.
7. These quantities are to be considered minimum requirements, and the CPIH/CIH must ensure an adequate quantity of samples are collected for each unique regulated area or activity in a way which is representative of the conditions. A reduction of monitoring may be permitted at the discretion of the VA Representative upon written request from the CPIH/CIH. Modifications to any air monitoring procedure shall not be implemented until a written authorization from the VA Representative has been received.
8. 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 to ensure the area is ready for inspection by the VPIH/CIH. 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.
9. Clearance Sampling
- a. Final visual inspection and clearance air monitoring shall be performed by the VPIH/CIH upon request by the CPIH/CIH. A minimum of 24 hours advance written notice shall be provided to the VPIH/CIH to ensure adequate time is afforded to schedule the final visual inspection and

clearance air monitoring. The final visual inspection and clearance air monitoring shall be conducted by the VPIH/CIH no later than 48 hours after receipt of the written request by the CPIH/CIH.

- b. A final visual inspection shall be conducted for all interior and exterior asbestos removal in accordance with ASTM E1368 regardless of the quantity of material removed or how the materials were removed. If any debris, residue, dust, or any other suspect material is detected, the final cleaning shall be repeated at no additional cost to the VA. When the regulated area is visually clean the final air clearance testing can be done.
- c. After an acceptable final visual inspection by the VPIH/CIH, the VPIH/CIH will perform the final clearance air monitoring. Samples will be collected and analyzed using methodologies specified in 40 CFR 763. If the work involves the removal of less than 260 linear feet, 160 square feet, or 35 cubic feet, PCM sampling may be conducted. If the work involves the removal of more than 260 linear feet, 160 square feet, or 35 cubic feet, TEM sampling shall be conducted. All clearance sampling must be conducted using aggressive means.
- d. Clearance air monitoring using PCM may be used when the work involves less than 260 linear feet, 160 square feet, or 35 cubic feet of asbestos removal and when no aggressive means were used to remove asbestos-containing materials. A minimum of five (5) samples collected from within the regulated area boundaries by aggressive means shall be used for PCM clearance air monitoring, and the analysis shall be performed in accordance with the latest published version of NIOSH NMAM Method 7400. The asbestos removal work for each regulated area may be considered complete if all five sample results are less than or equal to 0.01 f/cc. Samples exceeding the specified criteria may be reanalyzed, at no additional cost to the VA, using NIOSH NMAM TEM Method 7402. If the analysis shows the concentration of asbestos fibers to be less than or equal to 0.01 asbestos fibers/cc, then those samples are considered to have passed the clearance criteria.
- e. Clearance air monitoring using TEM is required when the work involves greater than or equal to 260 linear feet, 160 square feet, or 35 cubic feet. A minimum of five (5) samples collected from within the regulated area boundaries by aggressive means shall be used for TEM clearance air monitoring. TEM sampling and analysis must be done in accordance with the EPA Method specified in 40 CFR 763. The asbestos removal work for each regulated

area may be considered complete if all five sample results are less than or equal to 70 s/mm². Averaging of the sample results to achieve clearance criteria is explicitly prohibited for this project.

- f. Work in a regulated area is complete when the regulated area has successfully passed a final visual inspection and the laboratory results of the clearance air samples are below the clearance criteria for the type of analysis used.
- g. If the clearance criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures until clearance is achieved. All Additional inspection and testing costs will be borne by the Contractor.
- h. If clearance criteria are met, proceed to perform the abatement closeout and to issue the Certificate of Completion found in Attachment #1 of this section.

O. Site Inspection

- 1. While performing asbestos engineering control work, the Contractor must be subject to on-site inspection by the VPIH/CIH and/or the VA Representative. If the work is found to be in violation of this specification, the VA Representative will issue a stop work order to be in effect immediately and until the violation is resolved. All related costs including standby time required to resolve the violation must be at the Contractor's expense.

3.4.CLEAN-UP AND DISPOSAL

A. Housekeeping

- 1. Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR. When asbestos removal is complete, all asbestos waste is removed from the worksite, and final clean-up is completed, the VPIH/CIH and the VA Representative will attest that the area is safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order. The VPIH/CIH and/or a

qualified VA Representative will visually inspect all surfaces within the enclosure for residual material or accumulated dust or debris. The Contractor must re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The VPIH/CIH and the VA Representative must agree that the area is safe in writing before unrestricted entry will be permitted.

B. Title to Materials

1. All waste materials, except as specified otherwise, become the property of the Contractor and must be disposed of as specified in applicable local, state, and federal regulations and herein.

C. Disposal of Asbestos

1. Procedure for Disposal

- a. Coordinate all Waste Shipment Records with the VPIH/CIH and the VA Representative. The VA must be notified at least 24 hours in advance of any waste removed from the containment. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification.
- b. Collect asbestos waste, contaminated wastewater filters, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g., double plastic bags 6 mils thick, cartons, drums, or cans), and ensure any additional requirements of the landfill operator are met. Wastes within the containers must be wetted with amended water prior to disposal in accordance with 40 CFR 61-SUBPART M. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall be evacuated with HEPA vacuum and 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.
- 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. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 6-mil thick bags with the approved warnings and DOT labeling preprinted on the bag. Clearly indicate on the outside of each container the name of the waste generator and the location at which the waste was generated.
- e. Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Sealed waste bags shall be decontaminated on exterior surfaces by wet cleaning and HEPA vacuuming before being placed in the second waste bag and sealed, which then must also be wet wiped and HEPA vacuumed. Ensure that unauthorized persons do not have access to the waste material once it is outside the regulated area.
- f. 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.
- g. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or state-approved asbestos landfill off VA property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be assigned by the VPIH/CIH and/or the VA Representative. Comply with 40 CFR 61-SUBPART M, state, regional, and local standards for hauling and disposal. If allowed by the landfill, sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags must remain in the drum and the entire contaminated drum must be buried. Uncontaminated drums may be recycled. Workers unloading the sealed drums must wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.

2. Asbestos Disposal Quantity Report

- a. Direct the CP to record and report, to the VA Representative, the amount of asbestos-containing material removed and released for disposal. Deliver the

report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in the units used for quantities shown on the hazards abatement drawings.

- b. Allow the VPIH/CIH and/or the VA Representative to inspect, record, and report the amount of asbestos containing material removed and released for disposal on a daily basis at their discretion.

3. Abatement Closeout and Certificate of Compliance

- a. After successful achievement of clearance criteria:

- i. Remove all equipment and materials from the project area.
- ii. Dispose of all packaged ACM waste as required.
- iii. Repair or replace all interior finishes damaged during the abatement work, as required.
- iv. Fulfill other project closeout requirements as required in this specification.

- b. At the completion of the abatement and decontamination of the regulated area, the CPIH/CIH shall complete and sign the Certificate of Completion found in Attachment #1.

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:

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 of worker's acknowledgement, 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:

1. Physical Characteristics and Background Information on Asbestos
2. Potential Health Effects Related to Exposure to Asbestos
3. Employee Personal Protective Equipment
4. Establishment of a Respiratory Protection Program
5. State of the Art Work Practices
6. Personal Hygiene
7. Additional Safety Hazards
8. Medical Monitoring
9. Air Monitoring

10. Relevant Federal, State and Local Regulatory Requirements,
Procedures, and Standards
11. 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:

1. 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.
2. 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.
3. 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

- - - End of Section - - -

SECTION 02 83 00
LEAD REMEDIATION

PART 1 - GENERAL

1.1.CONTRACT DOCUMENTS AND RELATED REQUIREMENTS:

- A. Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show or describe 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, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work. In the event the Contractor/Sub-Contractor discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the VA Representative for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor/Sub-Contractor without obtaining guidance from the VA Representative shall become the sole risk and responsibility of the Contractor/Sub-Contractor. All costs incurred due to such action are also the responsibility of the Contractor/Sub-Contractor.

1.2.RELATED WORK

- A. 01 35 26 SAFETY REQUIREMENTS
- B. 02 41 00 SELECTIVE DEMOLITION
- C. 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
- D. 02 82 00 ASBESTOS REMEDIATION
- E. 02 84 16 HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY
- F. 07 84 00 FIRESTOPPING
- G. Division 09 FINISHES

1.3.REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. All work under this contract shall be done in strict accordance with all applicable federal, state, and local regulations, standards and codes governing lead-containing materials work,

and any other trade work done in conjunction with the project. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.

- C. The most recent edition of any relevant regulation, standard, document, or code shall be in effect. Where conflict among the requirements or with these specifications exists, the most stringent requirement(s) shall be utilized.
- D. All related regulations, statutes, public laws, registers, and regulatory guidance are incorporated by reference.

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP Z9.2 (2018) Fundamentals Governing the Design and
Operation of Local Exhaust Ventilation Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701 (2019) Standard Methods of Fire Tests for Flame
Propagation of Textiles and Films

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

HUD 6780 (1995; Errata Aug 1996; Rev Ch. 7 - 1997)
Guidelines for the Evaluation and Control of
Lead-Based Paint Hazards in Housing

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

29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
29 CFR 1926.103	Respiratory Protection
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

ADMINISTRATIVE RULES OF SOUTH DAKOTA (ARSD)

Article 74:27	Solid Waste
Article 74:28	Hazardous Waste
Article 74:34	Regulated Substance Discharges

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Dec 2017) UL Standard for Safety High-Efficiency Particulate, Air Filter Units
--------	---

1.4.DEFINITIONS

A. General

1. Definitions can be found in the applicable publications referenced by this specification.

B. Action Level

1. Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period.

C. Area Sampling

1. Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel (approximately 5 to 6 feet above the floor).

D. Contractor's Professional Industrial Hygienist (CPIH/CIH)

1. The Contractor's industrial hygienist who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations. The CPIH/CIH must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

E. Competent Person (CP)

1. As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the lead hazard. The Contractor may provide more than one CP as required to supervise and monitor the work.

F. Contaminated Room

1. Refers to a room for removal of contaminated personal protective equipment (PPE).

G. Decontamination Shower Facility

1. That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

H. Deleading

1. Activities conducted by a person who offers to remove hazards from lead-containing materials or to plan such activities in commercial buildings, bridges, or other structures.

I. Eight-Hour Time Weighted Average (TWA)

1. Airborne concentration of lead to which an employee is exposed, averaged over an 8-hour workday as indicated in 29 CFR 1926.62.

J. High Efficiency Particulate Air (HEPA) Filter Equipment

1. HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead contaminated particulate. A high efficiency particulate filter demonstrates at least 99.97 percent efficiency against 0.3 micron or larger size particles.

K. Lead

1. Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds.

L. Lead-Based Paint (LBP)

1. Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.

M. Lead Control Area

1. A system of control methods to prevent the spread of lead dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

N. Lead Permissible Exposure Limit (PEL)

1. Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than 8-hours in a workday, determine the PEL by the following formula:
 - a.
$$\text{PEL (micrograms/cubic meter of air)} = 400 / \text{No. hrs. worked per day}$$

O. Material Containing Lead/Paint with Lead (MCL/PWL)

1. Any material, including paint, which contains lead as determined by the testing laboratory using a valid test method. The requirements of this section do not apply if no detectable levels of lead are found using a quantitative method for analyzing paint or MCL using laboratory instruments with specified limits of detection of no greater than 60 parts per million. An X-Ray Fluorescence (XRF) instrument may not be used for the purposes of determining if no lead is present.

P. Personal Sampling

1. Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples must be representative of the employees' work tasks. Breathing zone must be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

Q. Physical Boundary

1. Area physically roped or partitioned off around lead control area to limit unauthorized entry of personnel.

R. VA Professional Industrial Hygienist (VPIH/CIH)

1. The Department of Veterans Affairs Professional Industrial Hygienist who is trained in the recognition and control of lead hazards in accordance with current federal, State, and

local regulations. The VPIH/CIH must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

S. VA Representative

1. The VA official responsible for on-going project work.

1.5.DESCRPTION

- A. Construction activities impacting PWL or materials containing lead which are covered by this specification include the demolition or removal of material containing lead in good to poor condition, located throughout the buildings and as indicated in the Hazardous Materials Assessment. The work covered by this section includes work tasks and the precautions specified in this section for the protection of building occupants and the environment during and after the performance of activities which disturb lead-containing materials.
- B. The work includes the disturbance, demolition, removal, and disposal of various lead-containing materials in project areas throughout the buildings only as necessary to accommodate the work of this project. The work may include, but is not limited to, disturbance of the following lead-containing materials in conditions ranging from good to poor condition:
 1. Paints, coatings, and coverings.
 2. Metallic lead.
 3. Dusts with measurable concentrations of lead.
 4. Plastic, vinyl, and rubber components.
 5. Glazings of ceramics.
- C. Except for waste testing, transportation, and disposal of lead-containing wastes, this specification applies only to work regulated by 29 CFR 1926.62 which applies to all personnel from all trades performing work under this contract. The work of this project is not classified as a "Lead Abatement" project as defined by 40 CFR 745 and is not regulated by 40 CFR 745, however, this section may include similar requirements. The disturbance of lead-containing materials is subject to regulation by 29 CFR 1926.62, 40 CFR Parts 260-273, and other closely related regulations.
- D. Protection of Existing Areas to Remain
 1. Project work including, but not limited to, removal or disturbance of lead-containing materials, storage, transportation, and disposal must be performed without damaging or contaminating adjacent work and areas. Where

such work or areas are damaged or contaminated, restore work and areas to the original condition at no additional cost to the VA.

E. Coordination with Other Work

1. Coordinate with work being performed in adjacent areas to ensure there are no exposure issues. Explain coordination procedures in the Lead Compliance Plan and describe how the Contractor will prevent lead exposure to other contractors performing work unrelated to lead activities, VA personnel, or building occupants.

1.6.SUBMITTALS

A. Submit the following in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES:

1. Competent Person Qualifications
2. Training Certification
3. Occupational and Environmental Assessment Data Report
4. Medical Examinations
5. Lead Waste Management Plan
6. Licenses, Permits and Notifications
7. Occupant Protection Plan
8. Lead Compliance Plan
9. Initial Sample Results
10. Written Evidence of TSD Approval
11. Contractor Experience and Qualifications
12. Affidavit of Medical Surveillance, Respiratory Protection, and Training Accreditation
13. Contractor/Competent Person(s) Review and Acceptance of the VA's Lead Specifications
14. Respirators
15. Vacuum Filters
16. Negative Air Pressure System
17. Materials and Equipment
18. Expendable Supplies
19. Local Exhaust Equipment

20. Pressure Differential Automatic Recording Instrument
21. Pressure Differential Log
22. Safety Data Sheets (SDS) For All Materials
23. Occupational and Environmental Assessment Data Report
24. Sampling Results
25. Pressure Differential Recordings for Local Exhaust System
26. Testing Laboratory
27. Contractor's Professional Industrial Hygienist (CPIH/CIH) Qualifications
28. Clearance Certification
29. Certificate Of Completion
30. Certificate Of Worker's Acknowledgement
31. Hazardous Waste Manifest

1.7.QUALITY ASSURANCE

A. General

1. Comply with laws, ordinances, rules, and regulations of federal, state, and local authorities having jurisdiction regarding removing, handling, storing, transporting, and disposing lead waste materials. Comply with applicable requirements of 29 CFR 1926.62, ARSD Article 74:27, ARSD Article 74:28, ARSD Article 74:34, and notify the VA Representative and request resolution of conflicts between regulations and specified requirements before starting work.
2. Submit a completed Certificate of Worker's Acknowledgement found in Attachment #2 of this section, a completed Affidavit of Medical Surveillance, Respiratory Protection, and Training Accreditation found in Attachment #3 of this section, and the Contractor/Competent Person(s) Review and Acceptance of the VA's Lead Specifications found in Attachment #4 of this section.

B. Responsibilities

1. 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. Coordinate utilities use, locations, and other conditions of use with the Contractor.

2. Contractor Responsibility

- a. The "Lead-Removal" Contractor (Contractor) shall assume primary responsibility and liability for compliance with all applicable Federal, State and Local regulations related to all aspects of the lead-related work. The General Contractor shall assume secondary responsibility and liability for their own and their other sub-contractor's compliance with all applicable federal, state, and local regulations as it relates to potential lead disturbance. The Contractor is responsible for providing and maintaining required documentation including but not limited to training, accreditations, medical exams, medical records, personal protective equipment (PPE), respiratory protection, and 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 or Sub-Contractor failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental regulations or contract requirements on the part of themselves, their employees, or their sub-contractors.

C. Contractors Use of Premises

1. The Contractor and Contractor's personnel shall cooperate fully with the VA representative 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.
2. 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. Qualifications

1. Contractor Experience and Qualifications

- a. Submit project experience within the past 3 years, listing projects first most similar to this project:
 - i. Project Name; Type of Work; Duration; Cost; Reference Name/Phone Number; Final Clearance; and Completion Date

- b. List of project(s) halted by owner, A/E, CPIH/CIH, regulatory agency in the last 3 years.
 - i. Project Name; Reason; Date; Reference Name/Number; and Resolution.
 - c. List lead-related regulatory citations (e.g., OSHA), notices of violations (e.g., Federal and state EPA), penalties, and legal actions taken against the company including the company's officers (including damages paid) in the last 5 years. Provide copies and all information needed for verification.
 - d. Evidence the Contractor has adequate liability/occurrence insurance which must including exclusions with a letter from agent stating in plain language the coverage provided and the fact that lead-related activities are covered by the policy for lead work as required by the state; is licensed to perform lead-related work in South Dakota; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for lead-related work; has adequate materials, equipment and supplies to perform the work.
2. Competent Person (CP)
- a. Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph COMPETENT PERSON (CP) RESPONSIBILITIES. Provide documented construction project-related experience with implementation of OSHA's Lead in Construction standard (29 CFR 1926.62) which shows ability to assess occupational and environmental exposure to lead; experience with the use of respirators, personal protective equipment, and other exposure reduction methods to protect employee health. Demonstrate a minimum of 4 years' experience, of which 2 years were as the CP on the project, implementing OSHA's Lead in Construction standard (29 CFR 1926.62). Submit evidence that the proposed CP has been the CP on 2 projects of similar size and complexity as this project within the past 3 years. Submit proper documentation that the CP is trained, licensed, and certified in accordance with federal, state, and local laws.
3. Training Certification
- a. Submit a certificate for each worker and supervisor, signed and dated by the accredited training provider, showing evidence that the employee has received the required lead training specified in 29 CFR 1926.62, has received training on the standard operating procedures of

the Contractor, and has applicable medical and respiratory protection documentation. Submit 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.

4. Testing Laboratory

- a. Submit the name, address, and telephone number of the testing laboratory selected to perform the air, soil, and wipe analysis, testing, and reporting of airborne concentrations of lead. Use a laboratory participating in the EPA National Lead Laboratory Accreditation Program (NLLAP) by being accredited by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis must be OSHA approved.

5. Contractor's Professional Industrial Hygienist (CPIH/CIH) Qualifications

- a. Submit the name, address, telephone number, and documentation of past experience of the Contractor's Professional Industrial Hygienist (CPIH/CIH) selected to perform the lead sampling. The CPIH/CIH shall have at least 5 years of monitoring experience and supervision of lead-related; has participated as senior CPIH on 5 abatement projects, 3 of which are similar in size and complexity as this project; has specialized OSHA training in lead-related work, respiratory protection, waste disposal and lead inspection; and has appropriate medical/respiratory protection records/documentation.

E. Requirements

1. Competent Person (CP) Responsibilities

- a. Verify training meets all federal, State, and local requirements.
- b. Review and approve Lead Compliance Plan for conformance to the applicable referenced standards.
- c. Continuously inspect LBP/PWL or MCL work for conformance with the approved plan.
- d. Recommend upgrades or downgrades (whichever is appropriate based on exposure) on the use of PPE (respirators included) and engineering controls.

- e. Ensure work is performed in strict accordance with specifications at all times.
- f. Control work to prevent hazardous exposure to human beings and to the environment at all times.
- g. Supervise final cleaning of the lead control area.
- h. Certify the conditions of the work as called for elsewhere in this specification.

2. Lead Compliance Plan

- a. Submit a detailed job-specific plan of the work procedures to be used in the disturbance of lead, LBP/PWL, or MCL. Include in the plan a sketch showing the location, size, and details of lead control areas, critical barriers, physical boundaries, location, and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, work practices, controls, and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking, hygiene facilities and sanitary procedures, interface of trades, sequencing of lead-related work, collected wastewater and dust containing lead, air sampling, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside of the lead control area. Include site preparation, cleanup, and clearance procedures. Include occupational and environmental sampling, training and strategy, sampling and analysis strategy and methodology, frequency of sampling, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multi-contractor worksites to inform affected employees and to clarify responsibilities to control exposures.

3. Occupational and Environmental Assessment Data Report

- a. If initial monitoring is necessary, submit occupational and environmental sampling results to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.
- b. In order to reduce the full implementation of 29 CFR 1926.62 the Contractor must provide documentation. Submit a report that supports the determination to reduce

full implementation of the requirements of 29 CFR 1926.62 and supporting Lead Compliance Plan.

- i. The initial monitoring must represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures per 29 CFR 1926.62. The data must represent the worker's regular daily exposure to lead for stated work.
- ii. Submit worker exposure data gathered during the task-based trigger operations of 29 CFR 1926.62 with a complete process description. This may include manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting, welding, cutting, and torch burning where lead-containing coatings are present.
- iii. The initial assessment must determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead compliance plan per 29 CFR 1926.62.

4. Medical Examinations

- a. Submit pre-work blood lead levels and post-work blood lead levels for all workers performing lead activities during the execution of the work. Initial medical surveillance as required by 29 CFR 1926.62 must be made available to all employees exposed to lead at any time (one day) above the action level. Full medical surveillance must be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records must show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62, and 29 CFR 1926.103. Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62. Maintain complete and accurate medical records of employees for the duration of employment plus 30 years.

5. Training

- a. Train each employee performing work that disturbs lead, who performs LBP/MCL/PWL disposal, and air sampling operations prior to the time of initial job assignment

and annually thereafter, in accordance with 29 CFR 1926.21 and 29 CFR 1926.62.

- b. Additional training related to health, safety, and environmental issues may be required, and it is the responsibility of the CPIH/CIH to identify those additional issues and to recommend training to the Contractor as necessary to ensure compliance with applicable regulations.

6. Respiratory Protection Program

- a. Establish and implement a respirator program as required by 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55. Submit a written description of the program to the VA Representative. Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

7. Hazard Communication Program

- a. Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Safety Data Sheets (SDS) for all materials brought to the site.

8. Lead Waste Management Plan

- a. The Lead Waste Management Plan must comply with applicable requirements of federal, state, and local hazardous waste regulations and address:
 - i. Identification and classification of wastes associated with the work.
 - ii. Estimated quantities of wastes to be generated and disposed of.
 - iii. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and operator and a 24-hour point of contact. Furnish two copies of USEPA hazardous waste manifests and USEPA Identification numbers if they are required due to generation of hazardous wastes.
 - iv. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
 - v. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

- vi. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.
- vii. Work plan and schedule for waste containment, removal, and disposal. Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers. Clean up and containerize wastes daily.
- viii. Include any process that may alter or treat waste rendering a hazardous waste non-hazardous. Treatment of wastes must be performed at a facility permitted to treat hazardous wastes. Treatment of wastes at the project site is prohibited.
- ix. Unit cost for hazardous waste disposal according to this plan.

9. Environmental, Safety and Health Compliance

- a. In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, state, and local authorities regarding lead. Comply with the applicable requirements of the current issue of 29 CFR 1926.62. Submit matters regarding interpretation of standards to the VA Representative for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirements apply.

F. Pressure Differential Recordings for Local Exhaust System

- 1. Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external to the enclosure and operate it continuously, 24-hours a day, until the temporary enclosure of the lead control area is removed. Submit pressure differential recordings for each workday to the CPIH/CIH for review and to the VPIH/CIH and VA Representative within 24-hours from the end of each workday.

G. Licenses, Permits and Notifications

- 1. Certify and submit in writing to the VA Representative at least 3 days prior to the commencement of work that licenses, permits, and notifications have been obtained. All associated fees or costs incurred in obtaining the licenses, permits and notifications shall be borne by the Contractor.

H. Occupant Protection Plan

1. The Contractor must develop and implement an Occupant Protection Plan describing the measures and management procedures to be taken during lead hazard abatement activities to protect the building occupants/building facilities and the outside environment from exposure to any lead contamination while lead activities are performed.

I. Pre-Construction Conference

1. After the pre-construction submittals have been reviewed and approved, a pre-construction meeting shall be held with the following parties in attendance at a minimum: the General Contractor, any Sub-Contractor(s) and their Competent Person(s) who will disturb lead-containing materials during the work, other interested Sub-Contractors, the Contractor's Professional Industrial Hygienist (CPIH/CIH), the Industrial Hygiene Technician, the VA Certified Industrial Hygienist (VPIH/CIH), and the VA Representative. The goals of the pre-construction meeting are to discuss the planned scope, phasing, and overall coordination and execution of the lead-related work; to verify that the approved pre-construction submittals are still valid; to identify any potential issues with the project scope, timing, or planning as it relates to the lead-related scope of work, and to ensure agreement among the parties prior to commencing work. The pre-construction meeting minutes and sign in sheet must be submitted to the VA Representative within 5 days after the completion of the pre-construction meeting.
2. No work shall commence until the pre-construction submittals have been approved, a pre-construction meeting held, and a written authorization to proceed with the work is provided by the VA Professional Industrial Hygienist (VPIH/CIH) and the VA Representative.

1.8.EQUIPMENT

A. Respirators

1. Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust, fume, and mist. Respirators must comply with the requirements of 29 CFR 1926.62.

B. Special Protective Clothing

1. Personnel exposed to lead contaminated dust must wear proper disposable protective whole-body clothing, head covering, gloves, eye, and foot coverings as required by 29 CFR

1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of personnel protection only after obtaining written approval from the CPIH/CIH and the CP.

C. Rental Equipment Notification

1. If rental equipment is to be used during PWL or MCL handling and disposal, notify the rental agency in writing concerning the intended use of the equipment.

D. Vacuum Filters

1. UL 586 labeled HEPA filters.

E. Equipment for VA Personnel

1. Furnish the VA Representative with 2 complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the lead removal work within the lead control area. Personal protective equipment must include disposable whole body covering, including appropriate foot, head, eye, and hand protection. PPE remains the property of the Contractor. The VA will provide respiratory protection for the VA Representative.

F. Abrasive Removal Equipment

1. The use of powered machines for vibrating, sanding, grinding, or abrasive blasting is prohibited unless equipped with local exhaust ventilation systems equipped with high efficiency particulate air (HEPA) filters.

G. Negative Air Pressure System

1. Minimum Requirements
 - a. Do not proceed with work in the area until containment is set up and HEPA filtration systems are in place. The negative air pressure system must meet the requirements of ASSP Z9.2 including approved HEPA filters in accordance with UL 586. Negative air pressure equipment must be equipped with new HEPA filters and be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Negative air pressure system minimum requirements are listed as follows:
 - i. The unit must be capable of delivering its rated volume of air with a clean first stage filter, an intermediate filter, and a primary HEPA filter in place.

- ii. The HEPA filter must be certified as being capable of trapping and retaining mono-disperse particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent.
- iii. The unit must be capable of continuing to deliver no less than 70 percent of rated capacity when the HEPA filter is 70 percent full or measures 2.5 inches of water static pressure differential on a magnehelic gauge.
- iv. Equip the unit with a manometer-type negative pressure differential monitor with minor scale division of 0.02 inch of water and accuracy within plus or minus 1.0 percent. The manometer must be calibrated daily as recommended by the manufacturer.
- v. Equip the unit with a means for the operator to easily interpret the readings in terms of the volumetric flow rate of air per minute moving through the machine at any given moment.
- vi. Equip the unit with an electronic mechanism that automatically shuts the machine off in the event of a filter breach or absence of a filter.
- vii. Equip the unit with an audible horn that sounds an alarm when the machine has shut itself off.
- viii. Equip the unit with an automatic safety mechanism that prevents a worker from improperly inserting the main HEPA filter.

2. Auxiliary Generator

- a. Provide an auxiliary generator with capacity to power a minimum of 50 percent of the negative air machines at any time during the work. When power fails, the generator controls must automatically start the generator and switch the negative air pressure system machines to generator power. The generator must not present a carbon monoxide hazard to workers or building occupants.

H. Vacuum Systems

- 1. Vacuum systems must be suitably sized for the project, and filters must be capable of trapping and retaining all mono-disperse particles as small as 0.3 micrometers (mean aerodynamic diameter) at a minimum efficiency of 99.97 percent. Properly dispose of used filters that are being replaced.

I. Heat Blower Guns

1. Heat blower guns must be flameless, electrical, paint-softener type with controls to limit temperature to 1,100 degrees F. Heat blower must be (grounded) 120 volts ac, and must be equipped with cone, fan, glass protector and spoon reflector nozzles.

1.9.PROJECT/SITE CONDITIONS

A. Protection of Existing Work to Remain

1. Perform work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition at no additional cost to the VA.

1.10. WARRANTY

- A. Construction Warranty: FAR clause 52.246 21, "Warranty of Construction".

PART 2 - PRODUCTS

2.1.MATERIALS AND EQUIPMENT

- A. Keep materials and equipment needed to complete the project available and on the site. Submit a description of the materials and equipment required; including Safety Data Sheets (SDSs) and manufacturer's instructions for use for materials brought onsite to perform the work.
- B. Expendable Supplies
1. Submit a description of the expendable supplies required.
 2. Polyethylene Bags
 - a. Disposable bags must be polyethylene plastic and be a minimum of 6-mils thick (4 mils thick if double bags are used) or any other thick plastic material shown to demonstrate at least equivalent performance; and capable of being made leak-tight. Leak-tight means that solids, liquids, or dust cannot escape or spill out.
 3. Polyethylene Leak-tight Wrapping
 - a. Wrapping used to wrap lead contaminated debris must be polyethylene plastic that is a minimum of 6-mils thick or any other thick plastic material shown to demonstrate at least equivalent performance.
 4. Polyethylene Sheeting
 - a. Sheeting must be polyethylene plastic with a minimum thickness of 6-mil, or any other thick plastic material

shown to demonstrate at least equivalent performance; and be provided in the largest sheet size reasonably accommodated by the project to minimize the number of seams. Where the project location constitutes an out of the ordinary potential for fire, or where unusual fire hazards cannot be eliminated, provide flame-resistant polyethylene sheets which conform to the requirements of NFPA 701.

5. Tape and Adhesive Spray

- a. Tape and adhesive must be capable of sealing joints between polyethylene sheets and for attachment of polyethylene sheets to adjacent surfaces. After dry application, tape or adhesive must retain adhesion when exposed to wet conditions, including amended water. Tape must be minimum 2 inches wide, industrial strength.

6. Containers

- a. When used, containers must be leak-tight and be labeled in accordance with EPA, DOT and OSHA standards.

7. Chemical Paint Strippers

- a. Chemical paint strippers must be bio-degradable, capable of removing existing paint layers in one application, be formulated to prevent stain, discoloration, or raising of the substrate materials, and must be acceptable to the VA Representative.

8. Chemical Paint Stripper Neutralizer

- a. Neutralizers for paint strippers must be compatible with the substrate and suitable for use with the chemical stripper that has been applied to the surface.

9. Detergents and Cleaners

- a. Detergents or cleaning agents must not contain trisodium phosphate and have demonstrated effectiveness in lead control work using cleaning techniques specified by HUD 6780 guidelines.

PART 3 - EXECUTION

3.1. PREPARATION

A. Protection

1. Notification

- a. Notify the VA Representative a minimum of 3 days prior to the start of any lead work.

2. Lead Control Area

- a. Physical Boundary - Provide physical boundaries around the lead control area by providing curtains, portable partitions, or other enclosures to ensure that lead will not escape outside of the lead control area. Prohibit the general public from accessing the lead control areas.
- b. Warning Signs - Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs must comply with the requirements of 29 CFR 1926.62.

3. Furnishings

- a. The VA will remove moveable furniture and equipment from the work areas before lead work begins.
- b. Fixed furniture and equipment will remain in the lead control area. Protect and cover furnishings that remain in the lead control area.

4. Heating, Ventilating and Air Conditioning (HVAC) Systems

- a. 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. Provide temporary HVAC system for areas in which HVAC has been shut down outside the lead control area.

5. Local Exhaust System

- a. Provide a local exhaust system in the lead control area in accordance with ASSP Z9.2 and 29 CFR 1926.62 that will provide at least 4 air changes per hour inside of the negative pressure enclosure. Local exhaust equipment must be operated 24-hours per day, until the lead control area is removed and must be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the lead control area of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. The building ventilation system must not be used as the local exhaust system for the lead control area. Filters on exhaust equipment must conform to ASSP Z9.2 and UL 586. Terminate the local exhaust system out of doors a minimum of 30 feet from building make-up air, doors, open windows, patients,

visitors, and staff unless the VA Representative allows an alternate arrangement.

6. Negative Air Pressure System Containment

- a. Operate the negative air pressure systems to provide at least 4 air changes per hour inside the containment. Operate the local exhaust unit equipment continuously until the containment is removed. Smoke test the negative air pressure system for leaks at the beginning of each shift. The certified supervisor is responsible to continuously monitor and keep a pressure differential log with an automatic manometric recording instrument. Notify the VA Representative immediately if the pressure differential falls below the prescribed minimum. Submit the continuously monitored pressure differential log, as specified. Do not use the building ventilation system as the local exhaust system. Terminate the local exhaust system out of doors a minimum of 30 feet from building make-up air, doors, open windows, patients, visitors, and staff unless the VA Representative allows an alternate arrangement. All filters must be new at the beginning of the project and be periodically changed as necessary to maintain specified pressure differential and disposed of as lead contaminated waste.
- b. Discontinuing Negative Air Pressure System. Operate the negative air pressure system continuously during lead activities unless otherwise authorized by the VA Representative. At the completion of the project, units must be run until full cleanup has been completed and final clearance testing requirements have been met. Dismantling of the negative air pressure systems must be as presented in the Lead Compliance Plan. Seal the HEPA filter machine intakes with polyethylene to prevent environmental contamination.

7. Decontamination Shower Facility

- a. Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

8. Eye Wash Station

- a. Provide suitable facilities within the work area for quick drenching or flushing of the eyes where eyes may be exposed to injurious corrosive materials.

9. Mechanical Ventilation System

- a. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62. To the extent

feasible, use local exhaust ventilation or other collection systems, approved by the CPH/CIH and CP. Evaluate and maintain local exhaust ventilation systems in accordance with 29 CFR 1926.62.

- b. Local exhaust must be equipped with HEPA filtration and must discharge out of doors a minimum of 30 feet from building make-up air, doors, open windows, patients, visitors, and staff unless the VA Representative allows an alternate arrangement.
- c. Use locally exhausted, power actuated tools or manual hand tools equipped with HEPA-filtered dust collection systems.

10. Personnel Protection

- a. Personnel must wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

3.2.ERECTION

A. Lead Control Area Requirements

- 1. Full containment - Contain removal operations using a negative pressure enclosure system with decontamination facilities and with HEPA filtered exhaust. For containment areas larger than 1,000 square feet install a minimum of two 18-inch square viewing ports. Locate ports to provide a view of the required work from the exterior of the enclosed contaminated area. Glaze ports with laminated safety glass.
- 2. 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.

3.3.APPLICATION

A. Lead Work

- 1. Perform lead work in accordance with approved Lead Compliance Plan. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead when the work is performed in accordance with 29 CFR 1926.62 and as specified herein. Dispose of all PWL or MCL and associated waste in compliance with federal, state, and local requirements.

B. Paint with Lead or Material Containing Lead Removal

1. Manual or power sanding or grinding of lead surfaces or materials is not permitted unless tools are equipped with HEPA attachments or wet methods. The dry sanding or grinding of surfaces that contain lead is prohibited. Provide methodology for removing lead in the Lead Compliance Plan. Select lead removal processes to minimize the potential of contamination of work areas outside the control area with lead contaminated dust or other lead contaminated debris or waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this removal process in the Lead Compliance Plan.
2. Avoid flash rusting and/or other deterioration of the substrate. Provide surface preparations for painting in accordance with SECTION 09 91 00 - PAINTING.
3. Paint with Lead or Material Containing Lead - Indoor Removal
 - a. Perform manual or mechanical removal and thermal cutting in the lead control areas using enclosures, barriers or containments and powered locally exhausted tools equipped with HEPA filters. Collect residue and debris for disposal in accordance with federal, state, and local requirements.
4. Paint with Lead or Material Containing Lead - Outdoor Removal
 - a. Perform outdoor removal as indicated in federal, state, and local regulations and in the Lead Compliance Plan. The worksite preparation (barriers or containments) must be job dependent and presented in the Lead Compliance Plan.

C. Personnel Exiting Procedures

1. Whenever personnel exit the lead control area, they must perform the following procedures and must not leave the workplace wearing any clothing or equipment worn in the control area:
 - a. Vacuum all clothing before entering the contaminated change room.
 - b. Remove protective clothing in the contaminated change room and place them in an approved impermeable disposal bag.
 - c. Shower.
 - d. Change to clean clothes prior to leaving the clean clothes storage area.

3.4.FIELD QUALITY CONTROL

A. Tests

1. Air and Wipe Sampling

- a. Conduct sampling for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling must be performed by the CPIH/CIH and/or the VPIH/CIH.
 - i. The CP must be on the job site to observe the air and wipe sampling and inspect the PWL or MCL removal work to ensure that the requirements of the contract have been satisfied during the entire PWL or MCL operation.
 - ii. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CPIH/CIH and CP. In addition, collect air samples on at least twenty-five percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
 - iii. Submit results of air samples, signed by the CPIH/CIH and CP, within 72-hours after the air samples are taken.
 - iv. Conduct area air sampling daily on each shift in which lead removal operations are performed at the following rates: a minimum of 2 inside the lead control area; a minimum of 2 outside the lead control area; or in a manner sufficient to ensure personnel are not exposed at or above 30 micrograms of lead per cubic meter of air. At no point shall lead in air concentrations exceed background levels outside of the lead control area. If 30 micrograms of lead per cubic meter of air is reached or exceeded within the lead control area or exceeds background levels outside of the lead control area, stop work and correct the conditions(s) causing the increased levels. Notify the VA Representative immediately. Determine if condition(s) require any further change in work methods. Resume removal work only after the CP and the VA Representative give approval.
 - v. Before any work begins, collect and analyze baseline wipe and soil samples in accordance with methods defined by federal, state, and local standards inside and outside of the physical boundary to assess the degree of dust contamination in the facility prior to lead disturbance or removal. Provide Initial Sample Results to the VA Representative before work begins.

vi. Surface Wipe Samples - Collect surface wipe samples on floors at a location no greater than 10 feet outside the lead control area at a frequency of once per day while lead removal work is conducted in occupied buildings. Surface wipe samples or Micro Vacuum surface sample results must meet criteria in paragraph CLEARANCE CERTIFICATION.

2. Sampling After Removal

- a. The VPIH/CIH must conduct a final visual inspection after the lead work is completed and collect wipe and soil samples according to the HUD protocol contained in HUD 6780 to determine the lead content of settled dust in micrograms per square meter foot of surface area and parts per million (ppm) for soil.

3. Testing of Material Containing Lead Residue

- a. Test all lead-containing waste stream(s) in accordance with 40 CFR 261 to determine if the waste stream(s) are classified as a hazardous waste.

3.5.CLEANING AND DISPOSAL

A. Cleanup

1. Maintain surfaces of the lead control area free of accumulations of dust and debris. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use pressurized air to clean up the area. At the end of each shift and when the lead operation has been completed, clean the controlled area of all visible contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the Lead Compliance Plan. Reclean areas showing dust or debris. After visible dust and debris is removed, wet wipe and HEPA vacuum all surfaces in the controlled area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CPIH/CIH and the CP must then certify in writing that the area has been cleaned of lead contamination before clearance testing.

2. Clearance Certification

- a. The CPIH/CIH and the CP must certify in writing that air samples collected outside the lead control area during lead removal operations remained less than background levels; the respiratory protection used 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 material and dust containing

lead left in the lead control areas in addition to the Certificate of Completion found in Attachment #1 of this section. Do not remove the lead control area or physical boundary and warning signs prior to receiving written authorization from the VA Representative.

- b. The VPIH/CIH must certify surface wipe sample results collected inside the lead control area are less than 10 micrograms of lead per square foot.
- c. The VPIH/CIH must certify surface wipe samples collected outside of the lead control area are not significantly greater than the initial surface loading determined prior to work.
- d. For exterior work, soil samples taken at the exterior of the work site must be used to determine if soil lead levels have increased at a statistically significant level (significant at the 95 percent confidence limit) from the soil lead levels prior to the operation. If soil lead levels either show a statistically significant increase above soil lead levels prior to work or soil lead levels above any applicable federal or state standard for lead, the soil must be remediated.

B. Disposal

- 1. Dispose of material, whether hazardous or non-hazardous in accordance with all laws and provisions and all federal, state, or local regulations. Ensure all waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.
- 2. Contractor is responsible for segregation of waste. Collect lead contaminated waste, scrap, debris, bags, containers, equipment, and lead contaminated clothing that may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62, 40 CFR 261, and 40 CFR 262 and corresponding state regulations.
- 3. Dispose of lead contaminated material classified as hazardous waste at an EPA approved hazardous waste treatment, storage, or disposal facility off VA property. Lead-containing wastes which are not classified as hazardous wastes may be disposed of in accordance with SECTION 02 41 00 - SELECTIVE DEMOLITION.
- 4. Accumulate waste materials in U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums or appropriately sized container for smaller volumes. Properly label each drum to identify the type of hazardous material (49 CFR 172). For hazardous waste, the collection container

requires marking/labeling in accordance with 40 CFR 262 and corresponding state regulations during the accumulation/collection timeframe. The VA Representative will assign an area for accumulation of waste containers. Coordinate authorized accumulation volumes and time limits with the VA Representative.

5. 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.
6. All lead waste generation, management, and disposal will be coordinated with the VA Representative.
7. Disposal Documentation
 - a. Coordinate all disposal or off-site shipments of lead waste with the VA Representative. Submit written evidence of TSD approval to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA, state, or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed, and dated by the initial transporter in accordance with 40 CFR 262. Provide a certificate that the waste was accepted by the disposal facility.
8. Payment for Hazardous Waste
 - a. Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility is received and approved by the VA Representative. The manifest must detail and certify the quantity of lead-containing materials or non-hazardous waste delivered to the treatment or disposal facility.

ATTACHMENT #1

CERTIFICATE OF COMPLETION

DATE: VA Project #:

PROJECT NAME:

Contractor/Sub-Contractor:

VAMC/ADDRESS:

1. I certify that I have personally inspected, monitored and supervised the lead-related 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 control 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 Contractor/Sub-Contractor engaged in this work were trained in respiratory protection, were experienced with lead-related work, had proper medical surveillance documentation, were fit-tested for their respirator, and were not exposed at any time during the work to lead 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 control area were always maintained in a safe and healthy condition and the maximum airborne concentrations of lead never exceeded 50 µg/m3, except as described below.
7. That all lead-related work was done in accordance with OSHA requirements and the manufacturer's recommendations.

CPIH/CIH Signature/Date:

CPIH/CIH Print Name:

Contractor/Sub-Contractor Signature/Date:

Contractor/Sub-Contractor Print Name:

ATTACHMENT #2

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME:

DATE:

PROJECT ADDRESS:

CONTRACTOR/SUB-CONTRACTOR NAME:

WORKING WITH LEAD CAN BE HAZARDOUS TO YOUR HEALTH. INHALING LEAD HAS BEEN LINKED TO VARIOUS ADVERSE HEALTH CONDITIONS.

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 typical equipment used for lead-related work. You must receive/have a current medical examination for working with lead. These things shall be provided at no cost to you. By signing this certificate of worker's acknowledgement, 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 my employer or a third-party training provider on the requirements contained in 29 CFR 1926.62 and was issued a certificate of training completion. The topics covered in the course include, as a minimum, the following:

1. The content of 29 CFR 1926.62 and its appendices;
2. The specific nature of the operations which could result in exposure to lead above the action level;
3. The purpose, proper selection, fitting, use, and limitations of respirators;
4. The purpose and a description of the medical surveillance program, and the medical removal protection program including information concerning the adverse health effects associated with excessive exposure to lead (with particular attention to the adverse reproductive effects on both males and females and hazards to the fetus and additional precautions for employees who are pregnant);
5. The engineering controls and work practices associated with the employee's job assignment including training of employees

to follow relevant good work practices described in Appendix B
of 29 CFR 1926.62;

6. The contents of any compliance plan in effect;
7. Instructions to employees that chelating agents should not
routinely be used to remove lead from their bodies and should
not be used at all except under the direction of a licensed
physician; and
8. The employee's right of access to records under 29 CFR 1910.20

MEDICAL EXAMINATION: I have had a medical examination within the past
12 months which was paid for by my employer. 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:

CONTRACTOR/SUB-CONTRACTOR NAME AND ADDRESS:

1. I verify that the following individual

Name:

Social Security Number:

who is proposed to be employed in lead-related work associated with the above project by the named Contractor/Sub-Contractor, is included in a medical surveillance program in accordance with 29 CFR 1926.62(j), and that complete records of the medical surveillance program as required by 29 CFR 1926.62(n) and 29 CFR 1910.20 are kept at the offices of the Contractor/Sub-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 1926.26(l). This individual has also obtained a valid certificate of training. 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/Sub-Contractor:

Date:

Printed Name of Contractor/Sub-Contractor:

ATTACHMENT #4

CONTRACTOR/COMPETENT PERSON(S) REVIEW AND ACCEPTANCE OF THE VA'S LEAD SPECIFICATIONS

VA Project Location:

VA Project#:

VA Project Description:

1. This form shall be signed by the Contractor/Sub-Contractor, VA and the Contractor/Sub-Contractor Competent Person(s) prior to any start of work at the VA related to this Specification. If the Contractor/Sub-Contractor's Competent Person(s) has not signed this form, they shall not be allowed to work on-site.
2. I, the undersigned, have read VA's Lead Specification regarding the lead-related work requirements. I understand the requirements of the VA's Lead 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 Lead 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 Lead Specification.
3. At the conclusion of the lead-related work, I will certify that all lead-related work was done in accordance with the VA's Lead Specification and all lead was removed properly.

Contractor/Sub-Contractor Signature

Date

- - - End of Section - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 02 84 16

HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY

PART 1 - GENERAL

1.1.CONTRACT DOCUMENTS AND RELATED REQUIREMENTS:

- A. Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show or describe 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, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work. In the event the Contractor/Sub-Contractor discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the VA Representative for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor/Sub-Contractor without obtaining guidance from the VA Representative shall become the sole risk and responsibility of the Contractor/Sub-Contractor. All costs incurred due to such action are also the responsibility of the Contractor/Sub-Contractor.

1.2.RELATED WORK

- A. 01 35 26 SAFETY REQUIREMENTS
- B. 02 41 00 SELECTIVE DEMOLITION
- C. 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
- D. 02 82 00 ASBESTOS REMEDIATION
- E. 02 83 00 LEAD REMEDIATION
- F. 07 84 00 FIRESTOPPING
- G. Division 09 FINISHES

1.3.REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. All work under this contract shall be done in strict accordance with all applicable federal, state, and local regulations, standards and codes governing asbestos work, and any other trade work done in conjunction with the project. All applicable codes,

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

- C. The most recent edition of any relevant regulation, standard, document, or code shall be in effect. Where conflict among the requirements or with these specifications exists, the most stringent requirement(s) shall be utilized.
- D. All related regulations, statutes, public laws, registers, and regulatory guidance are incorporated by reference.

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

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1910.1000	Air Contaminants
29 CFR 1910.1200	Hazard Communication
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 273	Standards for Universal Waste Management
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 178	Specifications for Packagings

ADMINISTRATIVE RULES OF SOUTH DAKOTA (ARSD)

Article 74:27	Solid Waste
Article 74:28	Hazardous Waste
Article 74:34	Regulated Substance Discharges

E. REQUIREMENTS

1. Removal and disposal of PCB-containing lighting ballasts and associated mercury-containing lamps. Contractor may encounter leaking PCB-containing ballasts and resultant contaminated components.

1.4.DEFINITIONS

A. Contractor's Professional Industrial Hygienist (CPIH/CIH)

1. The Contractor's industrial hygienist who is trained in accordance with 29 CFR 1910.120 and in the recognition and control of PCB and mercury hazards in accordance with current federal, state, and local regulations. The CPIH/CIH must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

B. Leak

1. Leak or leaking means any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

C. Lamps

1. Lamp is defined as the bulb or tube portion of an electric lighting device. A lamp is specifically designed to produce radiant energy, most often in the ultraviolet, visible, and infra-red regions of the electromagnetic spectrum. Examples of common electric lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide lamps.

D. Polychlorinated Biphenyls (PCBs)

1. PCBs as used in this specification shall mean the same as PCBs, and all related items, as defined in 40 CFR 761, Section 3, Definitions.

E. Spill

1. Spill means both intentional and unintentional spills, leaks, and other uncontrolled discharges when the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contamination resulting from those releases.

F. Universal Waste

1. Universal Waste means any of the following hazardous wastes that are managed under the universal waste requirements 40 CFR 273:

- a. Batteries as described in 40 CFR Part 273.2.
- b. Pesticides as described in 40 CFR Part 273.3.
- c. Mercury-containing equipment as described in 40 CFR Part 273.4.
- d. Lamps as described in 40 CFR Part 273.5.
- e. Aerosol cans as described in 40 CFR Part 273.6.

G. VA Professional Industrial Hygienist (VPIH/CIH)

- 1. The Department of Veterans Affairs Professional Industrial Hygienist who may be a Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant, or other qualified person who has successfully completed training in accordance with 29 CFR 1910.120. The VPIH/CIH must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

H. VA Representative

- 1. The VA official responsible for on-going project work.

1.5.QUALITY ASSURANCE

A. Regulatory Requirements

- 1. Perform PCB-related work in accordance with 40 CFR 761. Perform mercury-containing lamps storage and transport in accordance with 40 CFR 261, 40 CFR 264, 40 CFR 265, and 40 CFR 273.

B. Training

- 1. The Contractor shall provide workers who are trained and educated on the dangers of PCB and mercury exposure, decontamination, safe work practices, and in accordance with 29 CFR 1910.1200 and other applicable OSHA and EPA regulations. Certify the training of all persons involved in the removal of PCB-containing lighting ballasts and mercury-containing lamps. The VA Representative shall review and approve the PCB and Mercury-Containing Lamp Removal Work Plan.

C. Regulation Documents

- 1. Maintain at all times one copy each at the office and one copy each in view at the job site of 29 CFR 1910.1000, 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 265, 40 CFR 268, 40 CFR 270, 40 CFR 273, ARSD Article 74:27, ARSD Article 74:28, ARSD Article 74:34, and of the Contractor

removal work plan and disposal plan for PCB and for associated mercury-containing lamps.

D. Qualifications of Contractor's Professional Industrial Hygienist (CPIH/CIH)

1. Submit the name, address, and telephone number of the Qualifications of the Contractor's Professional Industrial Hygienist (CPIH/CIH). Submit training certification that the CPIH/CIH is certified, including certification number and date of certification or re certification.

E. PCB and Lamp Removal Work Plan

1. Submit a job-specific plan within 20 calendar days after the award of the contract. The plan must include the work procedures to be used in the removal, packaging, and storage of PCB-containing lighting ballasts and associated mercury-containing lamps; requirements for Personal Protective Equipment (PPE), spill cleanup procedures and equipment, eating, smoking and restroom procedures. The plan shall be approved by the VA Representative and signed by the Contractor. Obtain approval of the plan from the VA Representative prior to the start of PCB and/or lamp removal work.

F. PCB and Lamp Disposal Plan

1. Submit a PCB and Lamp Disposal Plan within 20 calendar days after the award of the contract. The PCB and Lamp Disposal Plan shall comply with applicable requirements of federal, state, and local PCB and Universal waste regulations and address:
 - a. Estimated quantities of wastes to be generated, disposed of, and recycled.
 - b. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location. Furnish two copies of EPA and state PCB and mercury-containing lamp waste permit applications and EPA identification numbers, as required.
 - c. Names and qualifications (experience and training) of personnel who will be working on-site with PCB and mercury-containing lamp wastes.
 - d. Spill prevention, containment, and cleanup contingency measures to be implemented.
 - e. Work plan and schedule for PCB and mercury-containing lamp waste removal, containment, storage, transportation,

disposal and or recycling. Wastes shall be cleaned up and containerize daily.

1.6.SUBMITTALS

- A. Submit the following in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES:
 - 1. Qualifications of Contractor's Professional Industrial Hygienist (CPIH/CIH)
 - 2. Training Certification
 - 3. PCB and Lamp Removal Work Plan
 - 4. PCB and Lamp Disposal Plan
 - 5. SD-11 Closeout Submittals
 - 6. Transporter Certification of notification to EPA of their PCB waste activities and EPA ID numbers
 - 7. Certification of Decontamination
 - 8. Certificate of Disposal and/or recycling. Submit to the Government before application for payment within 30 days of the date that the disposal of the PCB and mercury-containing lamp waste identified on the manifest was completed.
 - 9. Testing Results

1.7.ENVIRONMENTAL REQUIREMENTS

- A. Use special clothing:
 - 1. Disposable gloves (polyethylene).
 - 2. Eye protection.
 - 3. PPE as required by CPIH/CIH.

1.8.SCHEDULING

- A. Notify the Contracting Officer 20 days prior to the start of PCB and mercury-containing lamp removal work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1.WORK PROCEDURE

- A. Furnish labor, materials, services, and equipment necessary for the removal of PCB-containing lighting ballasts and associated mercury-containing lamps in accordance with local, state, or federal regulations. Do not expose PCBs to open flames or other

high temperature sources since toxic decomposition by-products may be produced. Do not break mercury-containing lamps.

B. Work Operations

1. Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with 40 CFR 761, 40 CFR 262 40 CFR 263, and the applicable requirements of this section, including but not limited to:
 - a. Obtaining suitable PCB and mercury-containing lamp storage sites.
 - b. Notifying the CPIH/CIH and the VA Representative prior to commencing the operation.
 - c. Reporting leaks and spills to the CPIH/CIH and the VA Representative.
 - d. Cleaning up spills.
 - e. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the CPIH/CIH and the VA Representative.
 - f. Maintaining inspection, inventory, and spill records.

3.2.PCB SPILL CLEANUP REQUIREMENTS

A. PCB Spills

1. Immediately report to the CPIH/CIH and the VA Representative any PCB spills.

B. PCB Spill Control Area

1. Secure the area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to a drip pan or other container.

C. PCB Spill Cleanup

1. 40 CFR 761, Subpart G. Initiate cleanup of spills as soon as possible, but no later than 24 hours of its discovery. Mop up the liquid with rags or other conventional absorbent. The spent absorbent shall be properly contained and disposed of as solid PCB waste.

D. Records and Certification

1. Document the cleanup with records of decontamination in accordance with 40 CFR 761, Section 125, Requirements for PCB Spill Cleanup. Provide test results of cleanup and certification of decontamination.

3.3.REMOVAL

A. Ballasts

1. As ballast are removed from the lighting fixture, inspect label on ballast. Ballasts without a "No PCB" label shall be assumed to contain PCBs and containerized and disposed of as required by this section. If there are less than 1600 "No PCB" labeled lighting ballasts, dispose of them as normal demolition debris. If there are more than 1600 "No PCB" labeled ballasts, establish whether the "No PCB" labeled ballasts contain diethylhexyl phthalate (DEHP) either by test or by checking with the ballast manufacturer indicated on the label. Submit testing results and/or written confirmation from the manufacturer to the VA Representative. If the ballasts do not contain DEHP, dispose of them in accordance with Section 02 41 00 SELECTIVE DEMOLITION. If they do contain DEHP, dispose of them as hazardous material in accordance with 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS. As a basis of bid assume ballasts with "No PCB" labels do not contain DEHP and may disposed of as normal construction debris. If 1600 or more DEHP ballasts are disposed of in a 24-hour period, notify the National Response Team at 800-424-8802.

B. Lighting Lamps

1. Remove lighting tubes/lamps from the lighting fixture and carefully place (unbroken) into appropriate containers (original transport boxes or equivalent). In the event of a lighting tube/lamp breaking, sweep and place waste in double plastic taped bags and dispose of as universal waste as specified herein.

3.4.STORAGE FOR DISPOSAL

A. Storage Containers for PCBs

1. Store PCB in containers approved by DOT for PCB and in accordance with 49 CFR 178.

B. Storage Containers for lamps

1. Store mercury-containing lamps in appropriate DOT containers. The boxes shall be stored and labeled for transport in accordance with 40 CFR 273.

C. Labeling of Waste Containers

1. Label with the following:
 - a. Date the item was placed in storage and the name of the cognizant activity/building.

- b. "Caution Contains PCB," conforming to 40 CFR 761, CFR Subpart C. Affix labels to PCB waste containers.
- c. Label mercury-containing lamp waste in accordance with 40 CFR 273. Affix labels to all lighting waste containers.

3.5.DISPOSAL

- A. Dispose of off VA property in accordance with EPA, DOT, and local regulations at a permitted site.
- B. Identification Number
 - 1. Federal regulations 40 CFR 761, and 40 CFR 263 require that generators, transporters, commercial storers, and disposers of PCB waste possess U.S. EPA identification numbers. The Contractor shall verify if the site has a U.S. EPA generator identification number for use on the Uniform Hazardous Waste manifest with the VA Representative. If not, the Contractor shall advise the VA Representative that it must file and obtain an I.D. number with EPA prior to commencement of removal work. For mercury-containing lamp removal, 40 CFR 273 requires that Large Quantity Handlers of Universal Waste (LQHUW) provide notification of universal waste management to the appropriate EPA Region (or state director in authorized states), obtain an EPA identification number, and retain for a minimum of three years records of offsite shipments of universal waste.
- C. 3.5.2 Transporter Certification
 - 1. Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263. Before transporting the PCB waste, sign, and date the manifest acknowledging acceptance of the PCB waste from the VA. Return a signed copy to the VA Representative before leaving the job site. Ensure that the manifest accompanies the PCB waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities (EPA Form 7710-53).
- D. Certificate of Disposal and/or Recycling
 - 1. Certificate for the PCBs and PCB items disposed shall include:
 - a. The identity of the disposal and or recycling facility, by name, address, and EPA identification number.
 - b. The identity of the PCB waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.
 - c. A statement certifying the fact of disposal and or recycling of the identified PCB waste, including the

date(s) of disposal, and identifying the disposal process used.

d. A certification as defined in 40 CFR 761.

- - - **End of Section** - - -

SECTION 031500
EXPANSION JOINT FILLER

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Application of closed cell foam expansion/contraction joint filler.

1.2 RELATED SECTIONS

- A. Section 030000 - Concrete.

1.3 REFERENCES

- A. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- B. ASTM D3575 - Standard Test Methods for Flexible Cellular Materials Made From Olefin Polymers.

1.4 SUBMITTALS

- A. Submit manufacturer's product data and application instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean, dry area in accordance with manufacturer's instructions.
- C. Protect materials during handling and application to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Inpro Corp. Architectural Products
- B. Insulation Corp. of America
- C. Tremco

- D. U.S. Bellows
- E. W. R. MEADOWS, INC

2.2 MATERIALS

- A. Performance Based Specification: expansion joint filler shall be flexible, lightweight, non-staining, polyethylene, and closed cell. It shall be a chemical-resistant, ultraviolet stable, non-absorbent, low density, compressible foam and have the following requirements:
 - 1. Density, ASTM D1751: 2.0 lbs/cu.ft. (32.04 kg/cu. m)
 - 2. Compression, ASTM D3575
 - a. 10% Deflection: 10 psi (69 KPa) maximum.
 - b. 80% Deflection: 125 psi (862.49 KPa) max.
 - 3. Tensile Strength, ASTM D3575: 55 psi (379.50 KPa)
 - 4. Water Absorption, ASTM D3575: 0.5% vol. maximum.
 - 5. Temperature Stability: -40°C to 71°C (-40°F to 160°F).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive expansion/contraction joint filler. Notify architect if areas are not acceptable. Do not begin application until unacceptable conditions have been corrected.

3.2 APPLICATION

- A. Install expansion-contraction joint filler in accordance with manufacturer's instructions.
- B. Attach expansion joint filler securely to the existing concrete slab, coping or form with tape or mechanical fasteners prior to pouring the concrete slab.
- C. Ensure that the expansion joint filler is level with the desired slab surfaces prior to finishing.
- D. Remove the pre-scored strip if applying joint sealant.
- E. Seal the concrete with joint sealant.

3.3 PROTECTION

- A. Protect pavement joint sealant from traffic until fully cured.

END OF SECTION 031500

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies cast-in-place structural concrete and materials and mixes for other concrete.

1.2 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

1.3 TESTING AGENCY FOR CONCRETE MIX DESIGN:

- A. Testing agency for the trial concrete mix design retained and reimbursed by the Contractor and approved by Resident Engineer. For all other testing, refer to Section 01 45 29 Testing Laboratory Services.
- B. Testing agency maintaining active participation in Program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology. Accompany request for approval of testing agency with a copy of Report of Latest Inspection of Laboratory Facilities by CCRL.
- C. Testing agency shall furnish equipment and qualified technicians to establish proportions of ingredients for concrete mixes.

1.4 TOLERANCES:

- A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 mm (+0 inch) and -20 mm (-3/4 inch).
- B. Reinforcement Fabricating and Placing: ACI 117, except that fabrication tolerance for bar sizes Nos. 10, 13, and 16 (Nos. 3, 4, and 5) (Tolerance Symbol 1 in Fig. 2.1(a), ACI, 117) used as column ties or stirrups is +0 mm (+0 inch) and -13 mm (-1/2 inch) where gross bar length is less than 3600 mm (12 feet), or +0 mm (+0 inch) and -20 mm (-3/4 inch) where gross bar length is 3600 mm (12 feet) or more.

- C. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +20 mm (+3/4 inch) and -6 mm (-1/4 inch). Tolerance of thickness of beams more than 300 mm (12 inch) but less than 900 mm (3 feet) is +20 mm (+3/4 inch) and -10 mm (-3/8 inch).
- D. Slab Finishes: ACI 117, Section 4.5.6, F-number method in accordance with ASTM E1155, except as follows:
1. Test entire slab surface, including those areas within 600 mm (2 feet) of construction joints and vertical elements that project through slab surface.
 2. Maximum elevation change which may occur within 600 mm (2 feet) of any column or wall element is 6 mm (0.25 inches).
 3. Allow sample measurement lines that are perpendicular to construction joints to extend past joint into previous placement no further than 1500 mm (5 feet).

1.5 REGULATORY REQUIREMENTS:

- A. ACI SP-66 - ACI Detailing Manual.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI 301 - Standard Specifications for Structural Concrete.

1.6 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Shop Drawings: Reinforcing steel: Complete shop drawings
- C. Mill Test Reports:
 1. Reinforcing Steel.
 2. Cement.
- D. Manufacturer's Certificates:
 1. Abrasive aggregate.
 2. Lightweight aggregate for structural concrete.
 3. Air-entraining admixture.
 4. Chemical admixtures, including chloride ion content.
 5. Waterproof paper for curing concrete.
 6. Liquid membrane-forming compounds for curing concrete.

7. Non-shrinking grout.
 8. Liquid hardener.
 9. Waterstops.
 10. Expansion joint filler.
 11. Adhesive binder.
- E. Testing Agency for Concrete Mix Design: Approval request including qualifications of principals and technicians and evidence of active participation in program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology and copy of report of latest CCRL, Inspection of Laboratory.
- F. Test Report for Concrete Mix Designs: Trial mixes including water-cement, concrete mix ingredients, and admixtures.
- G. Shoring and Reshoring Sequence: Submit for approval a shoring and reshoring sequence for flat slab/flat plate portions, prepared by a registered Professional Engineer. As a minimum, include timing of form stripping, reshoring, number of floors to be re-shored and timing of re-shore removal to serve as an initial outline of procedures subject to modification as construction progresses. Submit revisions to sequence, whether initiated by Resident Engineer (see FORMWORK) or Contractor.

1.7 DELIVERY, STORAGE, AND HANDLING:

- A. Conform to ACI 304. Store aggregate separately for each kind or grade, to prevent segregation of sizes and avoid inclusion of dirt and other materials.
- B. Deliver cement in original sealed containers bearing name of brand and manufacturer, and marked with net weight of contents. Store in suitable watertight building in which floor is raised at least 300 mm (1 foot) above ground. Store bulk cement in separate suitable bins.
- C. Deliver other packaged materials for use in concrete in original sealed containers, plainly marked with manufacturer's name and brand, and protect from damage until used.

1.8 PRE-CONCRETE CONFERENCE:

- A. General: At least 15 days prior to submittal of design mixes, conduct a meeting to review proposed methods of concrete construction to achieve the required results.
- B. Agenda: Includes but is not limited to:
 - 1. Submittals.
 - 2. Coordination of work.
 - 3. Availability of material.
 - 4. Concrete mix design including admixtures.
 - 5. Methods of placing, finishing, and curing.
 - 6. Finish criteria required to obtain required flatness and levelness.
 - 7. Timing of floor finish measurements.
 - 8. Material inspection and testing.
- C. Attendees: Include but not limited to representatives of Contractor; subcontractors involved in supplying, conveying, placing, finishing, and curing concrete; lightweight aggregate manufacturer; admixture manufacturers; Resident Engineer; Consulting Engineer; Department of Veterans Affairs retained testing laboratories for concrete testing and finish (F-number) verification.
- D. Minutes of the meeting: Contractor shall take minutes and type and distribute the minutes to attendees within five days of the meeting.

1.09 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):
 - 117-10Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - 211.1-91(R2009)Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

- 211.2-98 (R2004)Standard Practice for Selecting Proportions
for Structural Lightweight Concrete
- 214R-11Guide to Evaluation of Strength Test
Results of Concrete
- 301-10Standard Practice for Structural Concrete
- 304R-00 (R2009)Guide for Measuring, Mixing, Transporting,
and Placing Concrete
- 305.1-06Specification for Hot Weather Concreting
- 306.1-90 (R2002)Standard Specification for Cold Weather
Concreting
- 308.1-11Specification for Curing Concrete
- 309R-05Guide for Consolidation of Concrete
- 318-11Building Code Requirements for Structural
Concrete and Commentary
- 347-04Guide to Formwork for Concrete
- SP-66-04ACI Detailing Manual
- C. American National Standards Institute and American Hardboard
Association (ANSI/AHA):
- A135.4-2004Basic Hardboard
- D. American Society for Testing and Materials (ASTM):
- A82/A82M-07Standard Specification for Steel Wire,
Plain, for Concrete Reinforcement
- A185/185M-07Standard Specification for Steel Welded
Wire Reinforcement, Plain, for Concrete
- A615/A615M-09Standard Specification for Deformed and
Plain Carbon Steel Bars for Concrete
Reinforcement
- A653/A653M-11Standard Specification for Steel Sheet,
Zinc Coated (Galvanized) or Zinc Iron Alloy
Coated (Galvannealed) by the Hot Dip
Process

A706/A706M-09Standard Specification for Low Alloy Steel
Deformed and Plain Bars for Concrete
Reinforcement

A767/A767M-09Standard Specification for Zinc Coated
(Galvanized) Steel Bars for Concrete
Reinforcement

A775/A775M-07Standard Specification for Epoxy Coated
Reinforcing Steel Bars

A820-11Standard Specification for Steel Fibers for
Fiber Reinforced Concrete

A996/A996M-09Standard Specification for Rail Steel and
Axle Steel Deformed Bars for Concrete
Reinforcement

C31/C31M-10Standard Practice for Making and Curing
Concrete Test Specimens in the field

C33/C33M-11AStandard Specification for Concrete
Aggregates

C39/C39M-12Standard Test Method for Compressive
Strength of Cylindrical Concrete Specimens

C94/C94M-12Standard Specification for Ready Mixed
Concrete

C143/C143M-10Standard Test Method for Slump of Hydraulic
Cement Concrete

C150-11Standard Specification for Portland Cement

C171-07Standard Specification for Sheet Materials
for Curing Concrete

C172-10Standard Practice for Sampling Freshly
Mixed Concrete

C173-10...Standard Test Method for Air Content of
Freshly Mixed Concrete by the Volumetric
Method

C192/C192M-07Standard Practice for Making and Curing
Concrete Test Specimens in the Laboratory

C231-10	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C260-10	Standard Specification for Air Entraining Admixtures for Concrete
C309-11	Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
C330-09	Standard Specification for Lightweight Aggregates for Structural Concrete
C494/C494M-11	Standard Specification for Chemical Admixtures for Concrete
C618-12	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
C666/C666M-03 (R2008) .	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
C881/C881M-10	Standard Specification for Epoxy Resin Base Bonding Systems for Concrete
C1107/1107M-11	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
C1315-11	Standard Specification for Liquid Membrane Forming Compounds Having Special Properties for Curing and Sealing Concrete
D6-95 (R2011)	Standard Test Method for Loss on Heating of Oil and Asphaltic Compounds
D297-93 (R2006)	Standard Methods for Rubber Products Chemical Analysis
D412-06AE2	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
D1751-04 (R2008)	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

D4263-83(2012)Standard Test Method for Indicating
Moisture in Concrete by the Plastic Sheet
Method.

E1155-96(R2008)Standard Test Method for Determining F_F
Floor Flatness and F_L Floor Levelness
Numbers

F1249-13Standard Test Method for Water Vapor
Transmission Rate Through Plastic Film and
Sheeting Using a Modulated Infrared Sensor

F1869-11Standard Test Method for Measuring Moisture
Vapor Emission Rate of Concrete Subfloor
Using Anhydrous Calcium Chloride.

E. American Welding Society (AWS):

D1.4/D1.4M-11Structural Welding Code - Reinforcing Steel

F. Concrete Reinforcing Steel Institute (CRSI):

Handbook 2008

G. National Cooperative Highway Research Program (NCHRP):

Report OnConcrete Sealers for the Protection of
Bridge Structures

H. U. S. Department of Commerce Product Standard (PS):

PS 1Construction and Industrial Plywood

PS 20American Softwood Lumber

I. U. S. Army Corps of Engineers Handbook for Concrete and Cement:

CRD C513Rubber Waterstops

CRD C572Polyvinyl Chloride Waterstops

PART 2 - PRODUCTS:

2.1 FORMS:

A. Wood: PS 20 free from loose knots and suitable to facilitate
finishing concrete surface specified; tongue and grooved.

- B. Plywood: PS-1 Exterior Grade B-B (concrete-form) 16 mm (5/8 inch), or 20 mm (3/4 inch) thick for unlined contact form. B-B High Density Concrete Form Overlay optional.
- C. Metal for Concrete Rib-Type Construction: Steel (removal type) of suitable weight and form to provide required rigidity.
- D. Permanent Steel Form for Concrete Slabs: Corrugated, ASTM A653, Grade E, and Galvanized, ASTM A653, G90. Provide venting where insulating concrete fill is used.
- E. Corrugated Fiberboard Void Boxes: Double faced, completely impregnated with paraffin and laminated with moisture resistant adhesive, size as shown. Design forms to support not less than 48 KPa (1000 psf) and not lose more than 15 percent of their original strength after being completely submerged in water for 24 hours and then air dried.
- F. Form Lining:
1. Hardboard: ANSI/AHA A135.4, Class 2 with one (S1S) smooth side)
 2. Plywood: Grade B-B Exterior (concrete-form) not less than 6 mm (1/4 inch) thick.
- G. Concrete products shall comply with following standards for biobased materials:

Material Type	Percent by Weight
Concrete Penetrating Liquid	79 percent biobased material
Concrete form Release Agent	87 percent biobased material
Concrete Sealer	11 percent biobased material

The minimum-content standards are based on the weight (not the volume) of the material.

- H. Form Ties: Develop a minimum working strength of 13.35 kN (3000 pounds) when fully assembled. Ties shall be adjustable in length to permit tightening of forms and not have any lugs, cones, washers to act as spreader within form, nor leave a hole larger

than 20 mm (3/4 inch) diameter, or a depression in exposed concrete surface, or leave metal closer than 40 mm (1 1/2 inches) to concrete surface. Wire ties not permitted. Cutting ties back from concrete face not permitted.

2.2 MATERIALS:

- A. Portland Cement: ASTM C150 Type I or II.
- B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalies, and loss on ignition (LOI) not to exceed 5 percent.
- C. Coarse Aggregate: ASTM C33.
 - 1. Size 67 or Size 467 may be used for footings and walls over 300 mm (12 inches) thick.
 - 2. Coarse aggregate for applied topping, encasement of steel columns, and metal pan stair fill shall be Size 7.
 - 3. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.
- D. Lightweight Aggregates for Structural Concrete: ASTM C330, Table 1.
 - 1. Maximum size of aggregate not larger than one-fifth of narrowest dimension between forms, nor three-fourth of minimum clear distance between reinforcing bars. Contractor to furnish certified report to verify that aggregate is sound and durable, and has a durability factor of not less than 80 based on 300 cycles of freezing and thawing when tested in accordance with ASTM C666.
- E. Fine Aggregate: ASTM C33. Fine aggregate for applied concrete floor topping shall pass a 4.75 mm (No. 4) sieve, 10 percent maximum shall pass a 150 µm (No. 100) sieve.
- F. Mixing Water: Fresh, clean, and potable.
- G. Admixtures:

1. Water Reducing Admixture: ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
 2. Water Reducing, Retarding Admixture: ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.
 3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water.
 4. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.
 5. Air Entraining Admixture: ASTM C260.
 6. Microsilica: Use only with prior review and acceptance of the Resident Engineer. Use only in conjunction with high range water reducer.
 7. Calcium Nitrite corrosion inhibitor: ASTM C494 Type C.
 8. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
 9. Certification: Written conformance to the requirements above and the chloride ion content of the admixture prior to mix design review.
- H. Reinforcing Steel: ASTM A615, or ASTM A996, deformed, grade as shown.
- I. Welded Wire Fabric: ASTM A185.
- J. Reinforcing Bars to be Welded: ASTM A706.

- K. Reinforcement for Metal Pan Stair Fill: 50 mm (2 inch) wire mesh, either hexagonal mesh at .8Kg/m² (1.5 pounds per square yard), or square mesh at .6Kg/m² (1.17 pounds per square yard).
- L. Supports, Spacers, and Chairs: Types which will hold reinforcement in position shown in accordance with requirements of ACI 318 except as specified.
- M. Expansion Joint Filler: ASTM D1751.
- N. Sheet Materials for Curing Concrete: ASTM C171.
- O. Liquid Membrane-forming Compounds for Curing Concrete: ASTM C309, Type I, with fugitive dye, and shall meet the requirements of ASTM C1315. Compound shall be compatible with scheduled surface treatment, such as paint and resilient tile, and shall not discolor concrete surface.
- P. Liquid Hardener and Dustproofer: Fluosilicate solution of magnesium fluosilicate or zinc fluosilicate. Magnesium and zinc may be used separately or in combination as recommended by manufacturer. Use only on exposed slab. Do not use where floor is covered with resilient flooring, paint or other finish coating.
- Q. Moisture Vapor Emissions & Alkalinity Control Sealer: 100% active colorless aqueous siliconate solution concrete surface.
 - 1. ASTM C1315 Type 1 Class A, and ASTM C309 Type 1 Class A, penetrating product to have no less than 34% solid content, leaving no sheen, volatile organic compound (VOC) content rating as required to suite regulatory requirements. The product shall have at least a five (5) year documented history in controlling moisture vapor emission from damaging floor covering, compatible with all finish materials.
- R. Penetrating Sealer: For use on parking garage ramps and decks. High penetration silane sealer providing minimum 95 percent screening per National Cooperative Highway Research Program (NCHRP) No. 244 standards for chloride ion penetration resistance. Requires moist (non-membrane) curing of slab.

S. Non-Shrink Grout:

1. ASTM C1107, pre-mixed, produce a compressive strength of at least 18 MPa at three days and 35 MPa (5000 psi) at 28 days. Furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 1200 mm x 1200 mm (4 foot by 4 foot) base plate.
2. Where high fluidity or increased placing time is required, furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent under an 450 mm x 900 mm (18 inch by 36 inch) base plate.

2.3 CONCRETE MIXES:

A. Mix Designs: Proportioned in accordance with Section 5.3,

"Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318.

1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, admixtures, weight of fine and coarse aggregate per m³ (cubic yard) measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement ratio, and consistency of each cylinder in terms of slump.
3. Prepare a curve showing relationship between water-cement ratio at 7-day and 28-day compressive strengths. Plot each curve using at least three specimens.
4. If the field experience method is used, submit complete standard deviation analysis.

- B. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval of Resident Engineer or as specified. Making and testing of preliminary test cylinders may be carried on pending approval of cement providing Contractor and manufacturer certify that ingredients used in making test cylinders are the same. Resident Engineer may allow Contractor to proceed with depositing concrete for certain portions of work, pending final approval of cement and approval of design mix.
- C. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums.

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete Strength		Non-Air-Entrained	Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/m ³ (lbs/c. yd)	Max. Water Cement Ratio	Min. Cement kg/m ³ (lbs/c. yd)	Max. Water Cement Ratio
35 (5000) ^{1,3}	375 (630)	0.45	385 (650)	0.40
30 (4000) ^{1,3}	325 (550)	0.55	340 (570)	0.50
25 (3000) ^{1,3}	280 (470)	0.65	290 (490)	0.55
25 (3000) ^{1,2}	300 (500)	*	310 (520)	*

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. Lightweight Structural Concrete. Pump mixes may require higher cement values.
3. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.

4. Determined by Laboratory in accordance with ACI 211.1 for normal concrete or ACI 211.2 for lightweight structural concrete.

D. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as shown in Table II.

TABLE II - MAXIMUM SLUMP, MM (INCHES) *

Type of Construction	Normal Weight Concrete	Lightweight Structural Concrete
Reinforced Footings and Substructure Walls	75mm (3 inches)	75 mm (3 inches)
Slabs, Beams, Reinforced Walls, and Building Columns	100 mm (4 inches)	100 mm (4 inches)

E. Slump may be increased by the use of the approved high-range water-reducing admixture (superplasticizer). Tolerances as established by ASTM C94. Concrete containing the high-range-water-reducing admixture may have a maximum slump of 225 mm (9 inches). The concrete shall arrive at the job site at a slump of 50 mm to 75 mm (2 inches to 3 inches), and 75 mm to 100 mm (3 inches to 4 inches) for lightweight concrete. This should be verified, and then the high-range-water-reducing admixture added to increase the slump to the approved level.

F. Air-Entrainment: Air-entrainment of normal weight concrete shall conform with Table III. Air-entrainment of lightweight structural concrete shall conform with Table IV. Determine air content by either ASTM C173 or ASTM C231.

**TABLE III - TOTAL AIR CONTENT
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)**

Nominal Maximum Size of Total Air Content	Coarse Aggregate, mm (Inches) Percentage by Volume
10 mm (3/8 in).6 to 10	13 mm (1/2 in).5 to 9
20 mm (3/4 in).4 to 8	25 mm (1 in).3-1/2 to 6-1/2
40 mm (1 1/2 in).3 to 6	

**TABLE IV
AIR CONTENT OF LIGHTWEIGHT STRUCTURAL CONCRETE**

Nominal Maximum size of Total Air Content	Coarse Aggregate, mm's (Inches) Percentage by Volume
Greater than 10 mm (3/8 in) 4 to 8	10 mm (3/8 in) or less 5 to 9

- G. High early strength concrete, made with Type III cement or Type I cement plus non-corrosive accelerator, shall have a 7-day compressive strength equal to specified minimum 28-day compressive strength for concrete type specified made with standard Portland cement.
- H. Lightweight structural concrete shall not weigh more than air-dry unit weight shown. Air-dry unit weight determined on 150 mm by 300 mm (6 inch by 12 inch) test cylinders after seven days standard moist curing followed by 21 days drying at 23 degrees C \pm 1.7 degrees C (73.4 \pm 3 degrees Fahrenheit), and 50 (plus or minus 7) percent relative humidity. Use wet unit weight of fresh concrete as basis of control in field.
- I. Concrete slabs placed at air temperatures below 10 degrees C (50 degrees Fahrenheit) use non-corrosive, non-chloride accelerator. Concrete required to be air entrained use approved air entraining admixture. Pumped concrete, synthetic fiber concrete, architectural concrete, concrete required to be watertight, and

concrete with a water/cement ratio below 0.50 use high-range water-reducing admixture (superplasticizer).

- J. Durability: Use air entrainment for exterior exposed concrete subjected to freezing and thawing and other concrete shown or specified. For air content requirements see Table III or Table IV.
- K. Enforcing Strength Requirements: Test as specified in Section 01 45 29, TESTING LABORATORY SERVICES, during the progress of the work. Seven-day tests may be used as indicators of 28-day strength. Average of any three 28-day consecutive strength tests of laboratory-cured specimens representing each type of concrete shall be equal to or greater than specified strength. No single test shall be more than 3.5 MPa (500 psi) below specified strength. Interpret field test results in accordance with ACI 214. Should strengths shown by test specimens fall below required values, Resident Engineer may require any one or any combination of the following corrective actions, at no additional cost to the Government:
1. Require changes in mix proportions by selecting one of the other appropriate trial mixes or changing proportions, including cement content, of approved trial mix.
 2. Require additional curing and protection.
 3. If five consecutive tests fall below 95 percent of minimum values given in Table I or if test results are so low as to raise a question as to the safety of the structure, Resident Engineer may direct Contractor to take cores from portions of the structure. Use results from cores tested by the Contractor retained testing agency to analyze structure.
 4. If strength of core drilled specimens falls below 85 percent of minimum value given in Table I, Resident Engineer may order load tests, made by Contractor retained testing agency, on portions of building so affected. Load tests in accordance

- with ACI 318 and criteria of acceptability of concrete under test as given therein.
5. Concrete work, judged inadequate by structural analysis, by results of load test, or for any reason, shall be reinforced with additional construction or replaced, if directed by the Resident Engineer.

2.4 BATCHING AND MIXING:

- A. General: Concrete shall be "Ready-Mixed" and comply with ACI 318 and ASTM C94, except as specified. Batch mixing at the site is permitted. Mixing process and equipment must be approved by Resident Engineer. With each batch of concrete, furnish certified delivery tickets listing information in Paragraph 16.1 and 16.2 of ASTM C94. Maximum delivery temperature of concrete is 38°C (100 degrees Fahrenheit). Minimum delivery temperature as follows:

Atmospheric Temperature	Minimum Concrete Temperature
-1. degrees to 4.4 degrees C (30 degrees to 40 degrees F)	15.6 degrees C (60 degrees F.)
-17 degrees C to -1.1 degrees C (0 degrees to 30 degrees F.)	21 degrees C (70 degrees F.)

1. Services of aggregate manufacturer's representative shall be furnished during the design of trial mixes and as requested by the Resident Engineer for consultation during batching, mixing, and placing operations of lightweight structural concrete. Services will be required until field controls indicate that concrete of required quality is being furnished. Representative shall be thoroughly familiar with the structural lightweight aggregate, adjustment and control of mixes to produce concrete of required quality. Representative shall assist and advise Resident Engineer.

PART 3 - EXECUTION

3.1 FORMWORK:

- A. General: Design in accordance with ACI 347 is the responsibility of the Contractor. The Contractor shall retain a registered Professional Engineer to design the formwork, shores, and reshores.
1. Form boards and plywood forms may be reused for contact surfaces of exposed concrete only if thoroughly cleaned, patched, and repaired and Resident Engineer approves their reuse.
 2. Provide forms for concrete footings unless Resident Engineer determines forms are not necessary.
 3. Corrugated fiberboard forms: Place forms on a smooth firm bed, set tight, with no buckled cartons to prevent horizontal displacement, and in a dry condition when concrete is placed.
- B. 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.
- C. Size and Spacing of Studs: Size and space studs, wales and other framing members for wall forms so as not to exceed safe working stress of kind of lumber used nor to develop deflection greater than $1/270$ of free span of member.
- D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of

adjacent sheets to same stud with 6d box nails spaced not over 150 mm (6 inches) apart.

E. Wall Form Ties: Locate wall form ties in symmetrically level horizontal rows at each line of wales and in plumb vertical tiers. Space ties to maintain true, plumb surfaces. Provide one row of ties within 150 mm (6 inches) above each construction joint. Space through-ties adjacent to horizontal and vertical construction joints not over 450 mm (18 inches) on center.

1. Tighten row of ties at bottom of form just before placing concrete and, if necessary, during placing of concrete to prevent seepage of concrete and to obtain a clean line. Ties to be entirely removed shall be loosened 24 hours after concrete is placed and shall be pulled from least important face when removed.

2. Coat surfaces of all metal that is to be removed with paraffin, cup grease or a suitable compound to facilitate removal.

F. Inserts, Sleeves, and Similar Items: Flashing reglets, steel strips, masonry ties, anchors, wood blocks, nailing strips, grounds, inserts, wire hangers, sleeves, drains, guard angles, forms for floor hinge boxes, inserts or bond blocks for elevator guide rails and supports, 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, and maintained securely in place.

1. Locate inserts or hanger wires for furred and suspended ceilings only in bottom of concrete joists, or similar concrete member of overhead concrete joist construction.
2. Install sleeves, inserts and similar items for mechanical services in accordance with drawings prepared specially for mechanical services. Contractor is responsible for accuracy

and completeness of drawings and shall coordinate requirements for mechanical services and equipment.

3. Do not install sleeves in beams, joists or columns except where shown or permitted by Resident Engineer. Install sleeves in beams, joists, or columns that are not shown, but are permitted by the Resident Engineer, and require no structural changes, at no additional cost to the Government.
4. Minimum clear distance of embedded items such as conduit and pipe is at least three times diameter of conduit or pipe, except at stub-ups and other similar locations.
5. Provide recesses and blockouts in floor slabs for door closers and other hardware as necessary in accordance with manufacturer's instructions.

G. Construction Tolerances:

1. Set and maintain concrete formwork to assure erection of completed work within tolerances specified and to accommodate installation of other rough and finish materials. Accomplish remedial work necessary for correcting excessive tolerances. 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 PLACING REINFORCEMENT:

- A. General: Details of concrete reinforcement in accordance with ACI 318 unless otherwise shown.
- B. Placing: Place reinforcement conforming to CRSI DA4, unless otherwise shown.
 1. Place reinforcing bars accurately and tie securely at intersections and splices with 1.6 mm (16 gauge) black

- annealed wire. Use epoxy-coated tie wire with epoxy-coated reinforcing. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when building is occupied. Type, number, and spacing of supports conform to ACI 318. Where concrete slabs are placed on ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use of brick or stone supports will not be permitted.
2. Lap welded wire fabric at least 1 1/2 mesh panels plus end extension of wires not less than 300 mm (12 inches) in structural slabs. Lap welded wire fabric at least 1/2 mesh panels plus end extension of wires not less than 150 mm (6 inches) in slabs on grade.
 3. Splice column steel at no points other than at footings and floor levels unless otherwise shown.
- C. Spacing: Minimum clear distances between parallel bars, except in columns and multiple layers of bars in beams shall be equal to nominal diameter of bars. Minimum clear spacing is 25 mm (1 inch) or 1-1/3 times maximum size of coarse aggregate.
- D. Splicing: Splices of reinforcement made only as required or shown or specified. Accomplish splicing as follows:
1. Lap splices: Do not use lap splices for bars larger than Number 36 (Number 11). Minimum lengths of lap as shown.
 2. Welded splices: Splicing by butt-welding of reinforcement permitted providing the weld develops in tension at least 125 percent of the yield strength (fy) for the bars. Welding conform to the requirements of AWS D1.4. Welded reinforcing steel conform to the chemical analysis requirements of AWS D1.4.

- a. Submit test reports indicating the chemical analysis to establish weldability of reinforcing steel.
 - b. Submit a field quality control procedure to insure proper inspection, materials and welding procedure for welded splices.
 - c. Department of Veterans Affairs retained testing agency shall test a minimum of three splices, for compliance, locations selected by Resident Engineer.
3. Mechanical Splices: Develop in tension and compression at least 125 percent of the yield strength (fy) of the bars. Stresses of transition splices between two reinforcing bar sizes based on area of smaller bar. Provide mechanical splices at locations indicated. Use approved exothermic, tapered threaded coupling, or swaged and threaded sleeve. Exposed threads and swaging in the field not permitted.
- a. Initial qualification: In the presence of Resident Engineer, make three test mechanical splices of each bar size proposed to be spliced. Department of Veterans Affairs retained testing laboratory will perform load test.
 - b. During installation: Furnish, at no additional cost to the Government, one companion (sister) splice for every 50 splices for load testing. Department of Veterans Affairs retained testing laboratory will perform the load test.
- E. Bending: Bend bars cold, unless otherwise approved. Do not field bend bars partially embedded in concrete, except when approved by Resident Engineer.
- F. Cleaning: Metal reinforcement, at time concrete is placed, shall be free from loose flaky rust, mud, oil, or similar coatings that will reduce bond.
- G. Future Bonding: Protect exposed reinforcement bars intended for bonding with future work by wrapping with felt and coating felt with a bituminous compound unless otherwise shown.

3.3 VAPOR BARRIER:

- A. Except where membrane waterproofing is required, interior concrete slab on grade shall be placed on a continuous vapor barrier.
 - 1. Place 100 mm (4 inches) of fine granular fill over the vapor barrier to act as a blotter for concrete slab.
 - 2. Vapor barrier joints lapped 150 mm (6 inches) and sealed with compatible waterproof pressure-sensitive tape.
 - 3. Patch punctures and tears.

3.4 SLABS RECEIVING RESILIENT COVERING

- A. Slab shall be allowed to cure for 6 weeks minimum prior to placing resilient covering. After curing, slab shall be tested by the Contractor for moisture in accordance with ASTM D4263 or ASTM F1869. Moisture content shall be less than 3 pounds per 1000 sf prior to placing covering.
- B. In lieu of curing for 6 weeks, Contractor has the option, at his own cost, to utilize the Moisture Vapor Emissions & Alkalinity Control Sealer as follows:
 - 1. Sealer is applied on the day of the concrete pour or as soon as harsh weather permits, prior to any other chemical treatments for concrete slabs either on grade, below grade or above grade receiving resilient flooring, such as, sheet vinyl, vinyl composition tile, rubber, wood flooring, epoxy coatings and overlays.
 - 2. Manufacturer's representative will be on the site the day of concrete pour to install or train its application and document. He shall return on every application thereafter to verify that proper procedures are followed.
 - a. Apply Sealer to concrete slabs as soon as final finishing operations are complete and the concrete has hardened sufficiently to sustain floor traffic without damage.

- b. Spray apply Sealer at the rate of 20 m² (200 square feet) per gallon. Lightly broom product evenly over the substrate and product has completely penetrated the surface.
- c. If within two (2) hours after initial application areas are subjected to heavy rainfall and puddling occurs, reapply Sealer product to these areas as soon as weather condition permits.

3.5 CONSTRUCTION JOINTS:

- A. Unless otherwise shown, location of construction joints to limit individual placement shall not exceed 24,000 mm (80 feet) in any horizontal direction, except slabs on grade which shall have construction joints shown. Allow 48 hours to elapse between pouring adjacent sections unless this requirement is waived by Resident Engineer.
- B. Locate construction joints in suspended floors near the quarter-point of spans for slabs, beams or girders, unless a beam intersects a girder at center, in which case joint in girder shall be offset a distance equal to twice width of beam. Provide keys and inclined dowels as shown. Provide longitudinal keys as shown.
- C. Place concrete for columns slowly and in one operation between joints. Install joints in concrete columns at underside of deepest beam or girder framing into column.
- D. Allow 2 hours to elapse after column is cast before concrete of supported beam, girder or slab is placed. Place girders, beams, grade beams, column capitals, brackets, and haunches at the same time as slab unless otherwise shown.

3.6 EXPANSION JOINTS AND CONTRACTION JOINTS:

- A. Clean expansion joint surfaces before installing premolded filler and placing adjacent concrete.
- B. Provide contraction (control) joints in floor slabs as indicated on the contract drawings. Joints shall be either formed or saw cut, to the indicated depth after the surface has been finished.

Complete saw joints within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.7 PLACING CONCRETE:

A. Preparation:

1. Remove hardened concrete, wood chips, shavings and other debris from forms.
2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
3. Have forms and reinforcement inspected and approved by Resident Engineer before depositing concrete.
4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.

B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.

1. Preparing surface for applied topping:
 - a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.
 - b. Broom clean and keep base slab wet for at least four hours before topping is applied.
 - c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete is subject to approval of Resident Engineer.

D. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.

1. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1 1/2 hours.
2. Deposit concrete in forms as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
3. Do not drop concrete freely more than 3000 mm (10 feet) for concrete containing the high-range water-reducing admixture (superplasticizer) or 1500 mm (5 feet) for conventional concrete. Where greater drops are required, use a tremie or flexible spout (canvas elephant trunk), attached to a suitable hopper.
4. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 500 mm (20 inches) in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
5. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after its initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
6. On bottom of members with severe congestion of reinforcement, deposit 25 mm (1 inch) layer of flowing concrete containing the specified high-range water-reducing admixture (superplasticizer). Successive concrete lifts may be a continuation of this concrete or concrete with a conventional slump.
7. Concrete on metal deck:

a. Concrete on metal deck shall be minimum thickness shown. Allow for deflection of steel beams and metal deck under the weight of wet concrete in calculating concrete quantities for slab.

1) The Contractor shall become familiar with deflection characteristics of structural frame to include proper amount of additional concrete due to beam/deck deflection.

E. Consolidation: Conform to ACI 309. Immediately after depositing, spade concrete next to forms, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator applied directly into concrete at approximately 450 mm (18 inch) intervals. Mechanical vibrator shall be power driven, hand operated type with minimum frequency of 5000 cycles per minute having an intensity sufficient to cause flow or settlement of concrete into place. Vibrate concrete to produce thorough compaction, complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration.

1. Use of form vibration shall be approved only when concrete sections are too thin or too inaccessible for use of internal vibration.
2. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.

3.8 HOT WEATHER:

Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

3.9 COLD WEATHER:

Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

3.10 PROTECTION AND CURING:

A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at least 7 days after placing, except wet curing period for high-early-strength concrete shall be not less than 3 days. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by Resident Engineer.

1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer's instructions. Apply immediately after finishing. Maximum coverage 10m²/L (400 square feet per gallon) on steel troweled surfaces and 7.5m²/L (300 square feet per gallon) on floated or broomed surfaces for the curing/sealing compound.
2. Plastic sheets: Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with tape.

3. Paper: Utilize widest practical width paper and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.

3.11 REMOVAL OF FORMS:

- A. Remove in a manner to assure complete safety of structure after the following conditions have been met.
 1. Where structure as a whole is supported on shores, forms for beams and girder sides, columns, and similar vertical structural members may be removed after 24 hours, provided concrete has hardened sufficiently to prevent surface damage and curing is continued without any lapse in time as specified for exposed surfaces.
 2. Take particular care in removing forms of architectural exposed concrete to insure surfaces are not marred or gouged, and that corners and arises are true, sharp and unbroken.
- B. Control Test: Use to determine if the concrete has attained sufficient strength and curing to permit removal of supporting forms. Cylinders required for control tests taken in accordance with ASTM C172, molded in accordance with ASTM C31, and tested in accordance with ASTM C39. Control cylinders cured and protected in the same manner as the structure they represent. Supporting forms or shoring not removed until strength of control test cylinders have attained at least 70 percent of minimum 28-day compressive strength specified. Exercise care to assure that newly unsupported portions of structure are not subjected to heavy construction or material loading.
- C. Reshoring: Reshoring is required if superimposed load plus dead load of the floor exceeds the capacity of the floor at the time of loading. Reshoring accomplished in accordance with ACI 347 at no additional cost to the Government.

3.12 CONCRETE SURFACE PREPARATION:

- A. Metal Removal: Unnecessary metal items cut back flush with face of concrete members.

- B. Patching: Maintain curing and start patching as soon as forms are removed. Do not apply curing compounds to concrete surfaces requiring patching until patching is completed. Use cement mortar for patching of same composition as that used in concrete. Use white or gray Portland cement as necessary to obtain finish color matching surrounding concrete. Thoroughly clean areas to be patched. Cut out honeycombed or otherwise defective areas to solid concrete to a depth of not less than 25 mm (1 inch). Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 150 mm (6 inches) surrounding before placing patching mortar. Give area to be patched a brush coat of cement grout followed immediately by patching mortar. Cement grout composed of one part Portland cement, 1.5 parts fine sand, bonding admixture, and water at a 50:50 ratio, mix to achieve consistency of thick paint. Mix patching mortar approximately 1 hour before placing and remix occasionally during this period without addition of water. Compact mortar into place and screed slightly higher than surrounding surface. After initial shrinkage has occurred, finish to match color and texture of adjoining surfaces. Cure patches as specified for other concrete. Fill form tie holes which extend entirely through walls from unexposed face by means of a pressure gun or other suitable device to force mortar through wall. Wipe excess mortar off exposed face with a cloth.
- C. Upon removal of forms, clean vertical concrete surface that is to receive bonded applied cementitious application with wire brushes or by sand blasting to remove unset material, laitance, and loose particles to expose aggregates to provide a clean, firm, granular surface for bond of applied finish.

3.13 CONCRETE FINISHES:

A. Slab Finishes:

1. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of

- procedures to produce slabs within specified tolerances. Monitor elevations of structural steel in key locations before and after concrete placement to establish typical deflection patterns for the structural steel. Determine elevations of cast-in-place slab soffits prior to removal of shores. Provide information to Resident Engineer and floor consultant for evaluation and recommendations for subsequent placements.
2. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless Resident Engineer determines that the method is proving insufficient to meet required finish tolerances and directs use of rigid screed guides. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds. Adjust as necessary where monitoring of previous placements indicates unshored structural steel deflections to other than a level profile.
 3. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day. Slope finished slab to floor drains where they occur, whether shown or not.
 4. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.
 5. Immediately following screeding, and before any bleed water appears, use a 3000 mm (10 foot) wide highway straightedge in

- a cutting and filling operation to achieve surface flatness. Do not use bull floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.
6. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 6 mm (1/4 inch) indentation.
 7. Scratch Finish: Finish base slab to receive a bonded applied cementitious application as indicated above, except that bull floats and darbys may be used. Thoroughly coarse wire broom within two hours after placing to roughen slab surface to insure a permanent bond between base slab and applied materials.
 8. Float Finish: Slabs to receive unbonded toppings, steel trowel finish, fill, mortar setting beds, or a built-up roof, and ramps, stair treads, platforms (interior and exterior), and equipment pads shall be floated to a smooth, dense uniform, sandy textured finish. During floating, while surface is still soft, check surface for flatness using a 3000 mm (10 foot) highway straightedge. Correct high spots by cutting down and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections and re-float to a uniform texture.
 9. Steel Trowel Finish: Concrete surfaces to receive resilient floor covering or carpet, monolithic floor slabs to be exposed to view in finished work, future floor roof slabs, applied toppings, and other interior surfaces for which no other finish is indicated. Steel trowel immediately following floating. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure to compact cement paste and form a dense, smooth surface. Finished surface shall be smooth, free of trowel marks, and uniform in texture and appearance.

10. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:

a. Areas covered with carpeting, or not specified otherwise in

b. below:

1) Slab on Grade:

a) Specified overall value FF 25/FL 20

b) Minimum local value FF 17/FL 15

2) Level suspended slabs (shored until after testing) and topping slabs:

a) Specified overall value FF 25/FL 20

b) Minimum local value FF 17/FL 15

3) Unshored suspended slabs:

a) Specified overall value FF 25

b) Minimum local value FF 17

4) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.

b. Areas that will be exposed, receive thin-set tile or resilient flooring, or roof areas designed as future floors:

1) Slab on grade:

a) Specified overall value FF 36/FL 20

b) Minimum local value FF 24/FL 15

2) Level suspended slabs (shored until after testing) and topping slabs

a) Specified overall value FF 30/FL 20

b) Minimum local value FF 24/FL 15

3) Unshored suspended slabs:

a) Specified overall value FF 30

b) Minimum local value FF 24

4) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.

- c. "Specified overall value" is based on the composite of all measured values in a placement derived in accordance with ASTM E1155.
- d. "Minimum local value" (MLV) describes the flatness or levelness below which repair or replacement is required. MLV is based on the results of an individual placement and applies to a minimum local area. Minimum local area boundaries may not cross a construction joint or expansion joint. A minimum local area will be bounded by construction and/or control joints, or by column lines and/or half-column lines, whichever is smaller.

12. Measurements

- a. Department of Veterans Affairs retained testing laboratory will take measurements as directed by Resident Engineer, to verify compliance with FF, FL, and other finish requirements. Measurements will occur within 72 hours after completion of concrete placement (weekends and holidays excluded). Make measurements before shores or forms are removed to insure the "as-built" levelness is accurately assessed. Profile data for above characteristics may be collected using a laser level or any Type II apparatus (ASTM E1155, "profileograph" or "dipstick"). Contractor's surveyor shall establish reference elevations to be used by Department of Veterans Affairs retained testing laboratory.
- b. Contractor not experienced in using FF and FL criteria is encouraged to retain the services of a floor consultant to assist with recommendations concerning adjustments to slab thicknesses, finishing techniques, and procedures on measurements of the finish as it progresses in order to achieve the specific flatness and levelness numbers.

13. Acceptance/ Rejection:

- a. If individual slab section measures less than either of specified minimum local F_F/F_L numbers, that section shall be

rejected and remedial measures shall be required. Sectional boundaries may be set at construction and contraction (control) joints, and not smaller than one-half bay.

- b. If composite value of entire slab installation, combination of all local results, measures less than either of specified overall F_F/F_L numbers, then whole slab shall be rejected and remedial measures shall be required.
14. Remedial Measures for Rejected Slabs: Correct rejected slab areas by grinding, planing, surface repair with underlayment compound or repair topping, retopping, or removal and replacement of entire rejected slab areas, as directed by Resident Engineer, until a slab finish constructed within specified tolerances is accepted.

3.14 APPLIED TOPPING:

- A. Separate concrete topping on floor base slab of thickness and strength shown. Topping mix shall have a maximum slump of 200 mm (8 inches) for concrete containing a high-range water-reducing admixture (superplasticizer) and 100 mm (4 inches) for conventional mix. Neatly bevel or slope at door openings and at slabs adjoining spaces not receiving an applied finish.
- B. Placing: Place continuously until entire section is complete, struck off with straightedge, leveled with a highway straightedge or highway bull float, floated and troweled by machine to a hard dense finish. Slope to floor drains as required. Do not start floating until free water has disappeared and no water sheen is visible. Allow drying of surface moisture naturally. Do not hasten by "dusting" with cement or sand.

- - E N D - -

**SECTION 04 20 05
BRICK UNIT MASONRY**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Brick masonry veneer construction.

1.2 RELATED REQUIREMENTS

- A. Sealants and Sealant Installation: Section 07 92 00, JOINT SEALANTS.
- B. Color and Texture of Masonry Units: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Concrete Institute (ACI):
 - 1. 530.1/ASCE 6/TMS 602-13 - Specification for Masonry Structures.
- C. ASTM International (ASTM):
 - 1. C216-15 - Facing Brick (Solid Masonry Units Made From Clay or Shale).
- D. Brick Industry Association (BIA):
 - 1. TN 11B-88 - Guide Specifications for Brick Masonry, Part 3.

1.4 SUBMITTALS

- A. Samples:
 - 1. Face brick: Sample panel, 200 mm by 400 mm (24 inches by 24 inches,) showing full color range and texture of brick, bond, and proposed mortar joints.
- B. Sustainable Construction Submittals:
 - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
- C. Test reports: Certify products comply with specifications.
 - 1. Facing brick.
- D. Certificates: Certify products comply with specifications.
 - 1. Face brick.

1.5 STORAGE AND HANDLING

- A. Store products above grade, protected from contamination.
- B. Protect products from damage during handling and construction operations.

1.6 FIELD CONDITIONS

- A. Hot and Cold Weather Requirements: Comply with ACI 530.1/ASCE 6/TMS 602.

1.7 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES AND BRICK SPECIFIED IN 2.2 OF THIS SECTION.
- B. Provide each product from one manufacturer and from one production run.
- C. Sustainable Construction Requirements:

2.2 UNIT MASONRY PRODUCTS

- A. Brick:
 - 1. Face Brick Matching Existing Brick on Bldg 11
 - a. ASTM C216 17a, Grade SW, Type FB.
 - b. Brick when tested according to ASTM C67: Classified slightly efflorescent or better.
 - c. Size:
 - 1) Modular.
 - d. Manufacturer- TBD
 - e. Name and Color- TBD

2.3 ANCHORS, TIES, AND REINFORCEMENT

- A. Adjustable Veneer Anchor for Metal Stud Framed Walls:
 - 1. Two piece, adjustable anchor and tie.
 - 2. Anchor and tie may be either loop or angle type; provide only one type throughout.
 - 3. Loop Type:
 - a. Anchor: Screw on galvanized steel anchor strap 2.75 mm (0.11 inch) by 19 mm (3/4 inch) wide by 225 mm (9 inches) long, with 9 mm (0.35 inch) offset and 100 mm (4 inch) adjustment. Provide 5 mm (0.20 inch) hole at each end for fasteners.
 - b. Ties: Triangular tie, fabricated of 5 mm (0.20 inch) diameter galvanized cold drawn steel wire. Ties long enough to engage

anchor and be embedded minimum 50 mm (2 inches) into bed joint of masonry veneer.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Install products according to Brick Industry Association TN 11B-88, Brick manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's installation instructions deviate from BIA Guide, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Keep finish work free from mortar smears or spatters, and leave neat and clean.
- C. 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.
- D. Lintels:
 - 1. Lintels are not required for openings less than 1000 mm (40 inches) wide that have hollow metal door frames or for infill of existing openings.

3.2 INSTALLATION - ANCHORAGE

- A. Veneer to Framed Walls:
 - 1. Install adjustable veneer anchors.
 - 2. Fasten anchor to stud through insulation and sheathing with self-drilling and tapping screw, one at both ends of loop type anchor.
 - 3. Space anchors maximum 400 mm (16 inches) on center vertically at each stud.

3.3 INSTALLATION - BRICKWORK

- A. Lay clay brick according to BIA TN 11B.
- B. Laying:
 - 1. Lay brick in one-half running bond with bonded corners.
 - 2. Maintain bond pattern throughout.
 - 3. Do not use brick smaller than half-brick at any angle, corner, break, and jamb.

4. Where length of cut brick is greater than one half length, maintain vertical joint location.
5. Lay exposed brickwork joints symmetrical about center lines of openings.
6. Do not structurally bond multi-wythe brick walls, unless indicated on drawings.
7. Before starting work, lay facing brick on foundation wall and adjust bond to openings, angles, and corners.
8. Lay brick for sills with wash and drip.
9. Build solid brickwork as required for anchorage of items.

C. Joints:

1. Exterior Joint Widths: Lay for three equal joints in 200 mm (8 inches) vertically, unless shown otherwise.
2. Rake joints for pointing with colored mortar when colored mortar is not full depth.

D. Weep Holes:

1. Install weep holes at 600 mm (24 inches) on center in bottom of vertical joints of exterior masonry veneer or cavity wall facing over foundations, bond beams, and other water stops in wall.
2. Form weep holes using wicks made of mineral fiber insulation strips turned up 200 mm (8 inches) in cavity. Anchor top of strip to backup to securely hold in place.
3. Install sand or pea gravel in cavity approximately 75 mm (3 inches) high between weep holes.
4. Coordinate with building insulation for thickness of insulation and allowance of air space behind exterior wythe.

3.4 CONSTRUCTION TOLERANCES

- A. Lay masonry units plumb, level and true to line within tolerances according to ACI 530.1/ASCE 6/TMS 602 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) - 9 mm (3/8 inch).
 3. In 12,000 mm (40 feet) or more - 13 mm (1/2 inch).
- C. Maximum variation from level:
 1. In any bay or up to 6000 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 6000 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 13 mm (1/2 inch).
- F. Maximum variation in prepared opening dimensions:
 - 1. Accurate to minus 0 mm (0 inch).
 - 2. Plus 6 mm (1/4 inch).

3.5 CLEANING AND REPAIR

- A. General:
 - 1. Clean exposed masonry surfaces on completion per manufacturer's instructions.
 - 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.

- - E N D - -

---THIS PAGE LEFT INTENTIONALLY BLANK---

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural steel shapes, plates, and bars.
 - 2. Bolts, nuts, and washers.

1.2 RELATED REQUIREMENTS

- A. Materials Testing And Inspection During Construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Steel Joist: Section 05 21 00, STEEL JOIST FRAMING.
- 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.
- F. Steel Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.
- G. Steel Support: Section 10 13 00, DIRECTORIES.
- H. Painting: Section 09 91 00, PAINTING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Institute of Steel Construction (AISC):
 - 1. AISC Manual - Steel Construction Manual, 14th Ed.
 - 2. 303-10 - Code of Structural Steel Buildings and Bridges.
 - 3. 360-10: Specification for Structural Steel Buildings.
- C. The American Society of Mechanical Engineers (ASME):
 - 1. B18.22.1-09 - Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers.
- D. American Welding Society (AWS):
 - 1. D1.1/D1.1M-15 - Structural Welding Code - Steel.
- E. ASTM International (ASTM):
 - 1. A6/A6M-14 - General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - 2. A36/A36M-14 - Carbon Structural Steel.
 - 3. A53/A53M-12 - Pipe, Steel, Black and Hot-Dip, Zinc-Coated, Welded and Seamless.

4. A123/A123M-15 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 5. A242/A242M-13 - High-Strength Low-Alloy Structural Steel.
 6. A283/A283M-13 - Low and Intermediate Tensile Strength Carbon Steel Plates.
 7. A307-14 - Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 8. A500/A500M-13 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing and Rounds and Shapes.
 9. A501/A501M-14 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing and Rounds and Shapes.
 10. A572/A572M-15 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 11. A992/A992M-15 - Structural Shapes.
 12. F2329/F2329M-15 - Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy steel Bolts, Screws, washers, Nuts, and Special Threaded Fasteners.
 13. F3125/F3125M-15 - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions
- F. Master Painters Institute (MPI):
1. No. 18 - Primer, Zinc Rich, Organic.
- G. Occupational Safety and Health Administration (OSHA):
1. 29 CFR 1926.752(e) - Guidelines For Establishing The Components Of A Site-Specific Erection Plan.
 2. 29 CFR 1926-2001 - Safety Standards for Steel Erection.
- H. Research Council on Structural Connections (RCSC) of The Engineering Foundation:
1. Specification for Structural Joints Using ASTM F3125 Bolts.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
1. Show size, configuration, and fabrication and installation details.

C. Sustainable Construction Submittals:

Electronic Health Records Modernization

05 12 00 - 2 of 6

(EHRM) Infrastructure Upgrades

STRUCTURAL STEEL FRAMING

Hot Springs VA Medical Center

Project No. 568A4-21-702

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
- D. Test Reports: Certify products comply with specifications.
 1. Welders' qualifying tests.
- E. Certificates: Certify each product complies with specifications.
 1. Structural steel.
 2. Steel connections.
 3. Welding materials.
 4. Shop coat primer paint.
- F. Qualifications: Substantiate qualifications comply with specifications.
 1. Fabricator.
 2. Installer.
 3. Welders and welding procedures.
- G. Delegated Design Drawings and Calculations: Signed and sealed by responsible Architect/Engineer.
 1. Connection calculations.
- H. Record Surveys: Signed and sealed by responsible surveyor or engineer.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: AISC Quality Certification participant designated as AISC Certified Plant, Category STD.
 1. Regularly fabricates specified products.
 2. Fabricated specified products with satisfactory service on five similar installations for minimum five years.
- B. Installer Qualifications: AISC Quality Certification Program participant designated as AISC-Certified Erector, Category ACSE.
 1. Regularly installs specified products.
 2. Installed specified products with satisfactory service on five similar installations for minimum five years.
- C. Before commencement of Work, ensure steel erector provides written notification required by OSHA 29 CFR 1926.752(e). Submit a copy of the notification to Contracting Officer's Representative.
- D. Welders and Welding Procedures Qualifications: AWS D1.1/D1.1M.

1.6 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 MATERIALS

- A. W-Shapes:
 - 1. ASTM A992/A992M.
- B. Channel and Angles:
 - 1. ASTM A36/A36M.
- C. Plates and Bars:
 - 1. ASTM A36/A36M.
 - 2. ASTM A529; Grade 50.
- D. Hollow Structural Sections:
 - 1. ASTM A500/A500M.
- E. Structural Pipe: ASTM A53/A53M, Grade B.
- F. Bolts, Nuts and Washers: Galvanized for galvanized framing and plain finish for other framing.
 - 1. High-strength bolts, including nuts and washers: ASTM F3125.
 - 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: ASME B18.22.1.
- G. Welding Materials: AWS D1.1, type to suit application.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Sustainable Construction Requirements:
 - 1. Steel Recycled Content: 30 percent total recycled content, minimum.
 - 2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Paints and coatings.

2.3 FABRICATION

- A. Fabricate structural steel according to Chapter M, AISC 360.
- B. Shop and Field Connections:
 - 1. Weld connections according to AWS D1.1/D1.1M. 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.

2. High-Strength Bolts: High-strength bolts tightened to a bolt tension minimum 70 percent of their minimum tensile strength. 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. Twist-off torque bolts are not an acceptable alternate fastener for slip critical connections.

2.4 FINISHES

- A. Shop Priming:
 1. Prime paint structural steel according to AISC 303, Section 6.
 - a. Interstitial Space Structural Steel: Prime paint, unless indicated to receive sprayed on fireproofing.
- B. Shop Finish Painting: Apply primer and finish paint as specified in Section 09 91 00, PAINTING.
- C. Do not paint:
 1. Surfaces within 50 mm (2 inches) of field welded joints.
 2. Surfaces indicated to be encased in concrete.
 3. Surfaces receiving sprayed on fireproofing.
 4. Beam top flanges receiving shear connector studs applied.
- D. Structural Steel Galvanizing: ASTM A123/A123M, hot dipped, 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.
 1. Galvanize structural steel framing installed at exterior locations.
- E. Bolts, Nuts, and Washers Galvanizing: ASTM F2329, hot-dipped.

2.5 ACCESSORIES

- A. General: Shop paint steel according to AISC 303, Section 6.
- B. Finish Paint System: Primer and finish as specified in Section 09 91 00, PAINTING.
- C. Galvanizing Repair Paint: MPI No. 18.

PART 3 - EXECUTION

3.1 ERECTION

- A. Erect structural steel according to AISC 303 and AISC 360.

- B. Set structural steel accurately at locations and elevations indicated on drawings.
- C. Maintain erection tolerances of structural steel within AISC 303 requirements.
 - 1. Pour Stop Elevation Tolerance: 6 mm (1/4 inch), maximum, before concrete placement.
- D. Weld and bolt connections as specified for shop connections.

3.2 FIELD QUALITY CONTROL

- A. Record Survey:
 - 1. Engage registered land surveyor or registered civil engineer as specified in Section 01 00 00, GENERAL REQUIREMENTS to perform survey.
 - 2. Measure and record structural steel framing plumbness, level, and alignment after completing bolting and welding and before installation of work supported by structural steel.
 - 3. Identify deviations from allowable tolerances specified in AISC Manual.

- - E N D - -

SECTION 05 31 00
STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Single pan fluted metal form deck supporting concrete fill as roof substrate.
2. Corrugated metal form deck supporting concrete fill as roof substrate.
3. Single pan fluted metal roof deck as roof substrate.
4. Acoustic metal roof deck as roof substrate.

1.2 RELATED REQUIREMENTS

- A. Structural Steel Shapes: Section 05 21 00, STRUCTURAL STEEL FRAMING.
- B. Color: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Finish Painting: Section 09 91 00, PAINTING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. AISI - American Iron and Steel Institute.
 1. S100-12 - Specification for the Design of Cold-formed Steel Structural Members.
- C. American Welding Society (AWS):
 1. D1.1/D1.1M-15 - Structural Welding Code - Steel.
 2. D1.3/D1.3M-08 - Structural Welding Code - Sheet Steel.
- D. ASTM International (ASTM):
 1. A36/A36M-14 - Carbon Structural Steel.
 2. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 3. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable.
 4. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 5. E119-15 - Fire Tests of Building Construction and Materials.
- E. FM Global (FM):
 1. 1-28-15 - Wind Design.

- 2. Factory Mutual Research Approval Guide.
- F. Master Painters Institute (MPI):
 - 1. No. 18 - Primer, Zinc Rich, Organic.
- G. Military Specifications (Mil. Spec.):
 - 1. MIL-P-21035B - Paint, High Zinc Dust Content, Galvanizing Repair.
- H. Steel Deck Institute (SDI):
 - 1. No. 31-07 - Design Manual for Composite Deck, Form Decks, and Roof Decks.
- I. UL LLC (UL):
 - 1. Listed - Online Certifications Directory.
 - 2. 580-13 - Tests for Uplift Resistance of Roof Assemblies.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show layout, connections to supporting members, anchorage, sump pans, accessories, deck openings and reinforcements.
 - 2. Show similar information necessary for completing installation as shown and specified, including supplementary framing, ridge and valley plates, cant strips, cut openings, special jointing or other accessories.
 - 3. Show welding, side lap, closure, deck reinforcing and closure reinforcing details.
 - 4. 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:
 - 1. Description of each product.
 - 2. Show steel decking section properties and structural characteristics.
- D. Sustainable Construction Submittals:
 - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
- E. Certificates: Certify each product complies with specifications.
 - 1. Fire Resistance Product Listing: For each metal deck type and thickness supporting concrete slab or fill.

2. Show steel decking is UL Listed for specified application.
3. Show noise reduction coefficient test results.
- F. Qualifications: Substantiate qualifications comply with specifications.
 1. Welders and welding procedures.
- G. 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.

1.5 QUALITY ASSURANCE

- A. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual Global and are listed in "Factory Mutual Research Approval Guide" for "Class 1" fire rated construction.
- B. Welders and Welding Procedures Qualifications: AWS D1.3/D1.3M.

1.6 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Design steel decking and accessories according to AISI S100.
 1. Wind Uplift Resistance and Corner Conditions:
 - a. Eave Overhang: 3.8 kPa (82 psf), minimum.
 - b. Other Roof Areas: 3.8 kPa (82 psf), minimum.
 2. Fire Resistance: ASTM E119; as component of 2 hour rated roof assembly.
 3. Noise Reduction Coefficient (NRC): Minimum 0.90 when tested according to ASTM C423.
 4. Design side and end closures and attachment to supporting steel to safely support wet weight of concrete and construction loads.
 - a. Cantilever Closure Deflection: 3 mm (1/8 inch), maximum.

2.2 MATERIALS

- A. Galvanized Steel Sheet: ASTM A653/A653M; G60 coating.
- B. Painted Steel Sheet: ASTM A1008/A1008M, Grade C or D, shop primed.
- C. 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.

- D. Steel Shapes: ASTM A36/A36M.
- E. Acoustic Deck: Cellular deck profile, SDI Publication No. 31.
- F. Acoustic Insulation: Manufacturer's standard mineral fiber type, profile matching deck flute profile.

2.3 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Sustainable Construction Requirements:
 - 1. Steel Recycled Content: 30 percent total recycled content, minimum.

2.4 METAL ROOF DECK

- A. Metal Roof Deck: UL Listed as metal roof deck panels.
 - 1. Steel decking of the type, depth, thickness, and section properties as shown.
- B. Metal Form Deck - Type 1: Single pan fluted units as permanent form for reinforced concrete slabs.
 - 1. Depth and Thickness: As indicated on drawings.
 - 2. Material: Galvanized sheet steel.
- C. Metal Roof Deck: Single pan fluted units with flat horizontal top surfaces as permanent support for superimposed loads.
 - 1. Deck Style:
 - a. Wide Rib (Type B) deck.
 - b. Deep Rib (Type N) deck.
 - 2. Depth and Thickness: As indicated on drawings.
 - 3. Material: Galvanized sheet steel.
- D. Acoustic Metal Roof Deck Units: Single-pan fluted units with perforated vertical webs.
 - 1. Depth and Thickness: As indicated on drawings.
 - 2. Material: Galvanized sheet steel.
 - 3. Provide acoustical insulation to fill roof deck flutes.
- E. Do not use steel deck for hanging supports of building components including suspended ceilings, electrical light fixtures, plumbing, heating, or air conditioning pipes or ducts or electrical conduits.
- F. Include integral system for steel decking units used for interstitial levels.

1. Provide system suitable for simple point of attachment for light duty hanger devices.
2. Provide system suitable to allow for flexibility for attaching hangers for support of suspended ceilings, electrical, plumbing, heating, or air conditioning items, weight not to exceed 50 kg/m² (10 psf).
3. Provide a minimum spacing pattern of 300 mm (12 inches) on centers longitudinally and 600 mm (24 inches) on centers transversely.
4. Maximum allowable load suspended from any hanger: 23 kg (50 pounds).
5. System consisting of fold-down type hanger tabs or lip hanger is acceptable.

2.5 FABRICATION

- A. Fabricate steel decking in sufficient lengths to extend over 3 or more supports, except for interstitial levels.
 1. Cut metal deck units to proper length in shop.
- B. Fabricate accessories required to complete installation of steel decking.
 1. Exposed to View: Fabricate from sheet steel matching metal decking.
 2. Concealed from View: Fabricate from galvanized sheet steel.
- C. Sheet Metal Accessories:
 1. Metal Cover Plates: For end-abutting decking, to close gaps at changes in deck direction, columns, walls and openings.
 - a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
 2. Continuous Sheet Metal Edging: At openings, concrete slab edges and roof deck edges.
 - a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
 3. Metal Closure Strips: For openings between decking and other construction. Form to configurations required to provide tight-fitting closures at open ends of flutes and sides of decking.
 - a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
 4. Ridge and Valley Plates: Minimum 100 mm (4 inch) wide ridge and valley plates where roof slope exceeds 1/24 (1/2 inch per foot).
 - a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
 5. Cant Strips: Provide bent metal 45 degree leg cant strips where indicated on the drawings. Fabricate cant strips with minimum 125 mm (5 inch) face width.

- a. Sheet Steel: Minimum 0.8 mm (0.03 inch) thick.
- 6. Seat Angles for Deck: Provide where beam does not frame into column.
- 7. Sump Pans for Roof Drains: Fabricated from single piece galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain. Provide sump pans of adequate size to receive roof drains and with bearing flanges minimum 75 mm (3 inches) wide. Recess pans minimum 38 mm (1-1/2 inches) below roof deck surface, unless otherwise shown or required by deck configuration. Drain holes will be field cut.
 - a. Sheet Steel: Minimum 1.7 mm (0.06 inch) thick.

2.6 FINISHES

- A. Shop prime painted sheet steel with two coats of primer.

2.7 ACCESSORIES

- A. Primer: Manufacturer's standard primer compatible with finish painting specified in Section 09 91 00, PAINTING.
- B. Welding Materials: AWS D1.1, type to suit application.
- C. Galvanizing Repair Paint: MPI No. 18.
- D. Touch-Up Paint: Match shop finish.

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. Remove contaminates from structural steel surfaces where steel decking will be welded.
- D. Verify structural steel framing installation is completed, plumbed, and aligned with temporary bracing installed where required.
- E. Coordinate with structural steel erector to prevent overloading of structural members when placing steel decking for installation.

3.2 ERECTION

- A. Do not use floor deck units for storage or working platforms until permanently secured. Do not overload deck units once placed. Replace deck units that become damaged after erection and before casting concrete at no cost additional to the Government.

- B. Place steel decking at right angles to supporting members with ends located over supports.
- C. Lap end joints 50 mm (2 inches), minimum.
- D. Fluted Form Deck Fastening:
 - 1. Fasten form deck to steel supporting members by welding.
 - a. Welds: 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength.
 - b. Weld Spacing: Maximum 300 mm (12 inches) on center with minimum two welds per unit at each support.
 - c. Where two units abut, fasten each unit individually to supporting steel framework.
 - 2. End Closure Fastening: Tack weld or self-tapping No. 8 or larger machine screws at 900 mm (3 feet) on center.
 - a. Longitudinal End Closure Fastening: Tack weld only.
 - 3. Weld side laps of adjacent decking units.
 - a. Fastener Locations: Mid-span and maximum 900 mm (3 feet) on center.
- E. Corrugated Form Deck Fastening:
 - 1. Weld end laps of corrugated form deck units in valley of side lap and at middle of sheet.
 - a. Weld Spacing: Maximum 380 mm (15 inches) on center.
 - 2. Weld corrugated deck to intermediate supports in X-pattern. Weld in valley of side laps on every other support and in valley of center corrugation on remaining support.
 - a. Weld Spacing: Maximum 760 mm (30 inches) on center.
- F. Roof Deck Fastening:
 - 1. Fasten decking to steel supporting members by welding.
 - a. Welds: 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength.
 - b. Weld Spacing: Maximum 300 mm (12 inches) on center at every support. Use closer spacing where required for lateral force resistance by diaphragm action.
 - 2. Fasten split or partial decking panels to structure in every valley.
 - 3. Fasten decking to each supporting member at ribs where side laps occur.

- a. Power driven fasteners is acceptable in lieu of welding if strength equivalent to welding specified above is provided. Submit test data and design calculations verifying equivalent design strength.
- 4. Mechanically fasten decking side laps with self-tapping No. 8 or larger machine screws.
 - a. Fastener Locations: Mid-span and maximum 900 mm (3 feet) on center.
- 5. Provide additional fastening necessary to comply with UL Listing for specified performance.
- G. Cutting and Fitting:
 - 1. Field cut steel decking to accommodate columns and other penetrating items.
 - 2. Cut openings located and dimensioned on Structural Drawings.
 - 3. Coordinate openings for other penetrations shown on approved submittal drawings but not shown on Structural Drawings.
 - a. Cut and reinforce required opening.
 - 4. Make cuts neat and trim using metal saw, drill or punch-out device. Cutting with torches is prohibited.
 - 5. Do not make cuts in the metal deck that are not shown on the approved metal decking submittal drawings.
 - a. When additional openings are required, submit scaled drawing, locating required opening and other openings and supports in immediate area.
 - b. Do not cut the opening until drawing is approved by Contracting Officer's Representative.
 - c. Provide additional reinforcing and framing required for opening.
 - d. Failure to comply with these requirements is cause for rejection of the work and removal and replacement of the affected steel decking.
 - 6. Opening Reinforcement: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work.
- H. Touch up damaged factory finishes.
 - 1. Apply galvanizing repair paint to damaged galvanized surfaces.
 - 2. Apply touch up paint to damaged shop painted surfaces.

HOT SPRINGS VA MEDICAL CENTER
HOT SPRINGS, SD

100% FINAL SOLUTION
02/23/2022

- - E N D - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 05 36 00
COMPOSITE METAL DECKING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. 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:

- A. Materials testing and inspection during construction:
Section 01 45 29, TESTING LABORATORY SERVICES.

1.3 DESIGN REQUIREMENTS:

- A. Design steel decking in accordance with AISI S-100, except as otherwise shown or specified.

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.
 - 1. Show welding, side lap, closure, deck reinforcing and closure reinforcing details.
 - 2. Show openings required for work of other trades, including openings not shown on structural drawings.
 - 3. Indicate where temporary shoring is required to satisfy design criteria.
- C. Manufacturer's Literature and Data: Showing steel decking section properties and specifying required structural characteristics.
- D. Manufacturer's written recommendations for:
 - 1. Shape of decking section.

- 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.
- G. Welding power setting recommendation by shear stud manufacturer.
- H. Shear Stud Layouts: Submit drawings showing the quantity, pattern, spacing and configuration of shear studs for each beam and girder.
- I. Certification: For each type and gauge of metal deck supporting concrete slab or fill, submit certification of specified fire ratings. Certify that units supplied are UL listed as a "Steel Floor and Form Unit".
- J. Manufacturers Certificates for deck units attesting compliance with specified requirements.
- K. Submit manufacturer's catalog data for Welding Equipment and Welding Rods and Accessories intended use.
- L. Power Actuated Tool Operator Certificates.
- M. Welders qualifications.

1.5 QUALITY ASSURANCE:

- A. Fire Safety
 - 1. 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.
- B. Deck Units: Provide deck units and accessory products from a manufacturer engaged in the manufacture of steel decking for more than three (3) years. Submit manufacturer's certificates attesting that the decking material complies with the specified requirements.

- C. Certification of Powder-Actuated Tool Operator: Manufacturer's certificate attesting that the operators are authorized to use the low velocity powder-actuated tool.
- D. Qualifications for Welding Work: Submit qualified welder qualifications in accordance with AWS D1.1/D1.1M or under an approved qualification test.

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 referenced Standards and codes.
- B. American Iron and Steel Institute (AISI):
 - S-100-12North American Specification for the Design of Cold-Formed Steel Structural Members
- C. ASTM International (ASTM):
 - A36/A36M-14Carbon Structural Steel
 - A108-13Steel Bars, Carbon, Cold Finished, Standard Quality
 - A653/A653M-13Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
- 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/D1.1M-11Structural Welding Code - Steel
 - D1.3/D1.3M-05(R2008) .Structural Welding Code - Sheet Steel
- F. FM Global (FM):
 - APP GuideApproval Guide
 - DS 1-28-2012Design Wind Loads

G. Military Specifications (Mil. Spec.):

MIL-P-21035BPaint, High Zinc Dust Content, Galvanizing
Repair

H. Underwriters Laboratories (UL):

Bld Mat Dir (Annually) Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Steel Decking and Flashings: ASTM A653/A653M, Structural Quality.

B. Galvanizing: ASTM A653/A653M. Thickness not less than indicated
on drawings.

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.

1. Provide studs of uniform diameter, with heads concentric and
on same axis to shaft.

2. Provide studs, after welding, free from substance or defect
which would interfere with its function as a shear connector.

3. Do not paint or galvanize studs.

4. Provide size of studs as shown on drawings.

5. Provide studs manufactured by a company normally engaged in
the manufacturer of shear studs, and can furnish equipment
suitable for weld-through installation of shear studs.

D. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035B.

E. Miscellaneous Steel Shapes: ASTM A36/A36M.

F. Welding Electrode: E60XX minimum.

G. Sheet Metal Accessories: ASTM A653/A653M, 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 and concrete slab 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 to be designed by the manufacturer to safely support the wet weight of concrete and construction loads. The deflection of cantilever closures to be limited to a total of 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. 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 on contract documents. Provide edges of deck with vertical interlocking male and female lip providing for a positive mechanical connection.
- B. Fabricate deck units with integral embossments to provide mechanical bond with concrete slab. Deck units combined with concrete slab to be capable of supporting total design loads.
- C. Provide integral system with single point of attachment for light duty hanger devices for flexibility for attaching hangers for support of acoustical, plumbing, heating, air conditioning electrical and similar items.
 1. Provide a minimum spacing pattern of 305 mm (12 inches) on centers longitudinally and 610 mm or 914 mm (24 or 36 inches) on centers transversely.

2. Provide suspension system capable of safely supporting a maximum allowable load of 45 kg (100 pounds) concentrated at one hanger attachment point.
3. System may consist of fold-down type hanger tabs or a lip hanger.

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.
 1. Remove 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.
 1. Do not overload deck units once placed.
 2. Replace deck units that become damaged after erection and prior to casting concrete at no additional cost to the Government.
- D. Erect steel deck in accordance with manufacturer's printed instructions.
- E. Ship steel deck units in standard widths and fabricated to proper length.
- F. Provide steel decking in sufficient lengths to extend over 3 or more spans, except where structural steel layout does not permit.
- G. Place steel decking units on supporting steel framework and adjust to final position before being permanently fastened.
 1. Bring each unit to proper bearing on supporting beams.

2. 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.
 3. Maximum space between ends of abutting units is 13 mm (1/2 inch). If space exceeds 13 mm (1/2 inch), install closure plates.
- H. Ceiling hanger loops, if provided, must be flattened or removed to obtain bearing of units on structural steel.
- I. 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) on center 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 914 mm (3 feet) on center 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 914 mm (3 feet) on center, whichever is smaller.
- J. Weld in conformance to AWS D1.3/D1.3M and done by qualified experienced welding mechanics.
- K. Clean and touch-up area and welds scarred during erection, and repair with zinc rich galvanizing repair paint.
1. Paint touch-up is not required for welds or scars that are to be in direct contact with concrete.
- L. Provide metal concrete stops at edges of deck.
- M. Cutting and Fitting:
1. Fabricate metal deck units to proper length 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.
4. Make cuts and penetrations neat and trim using a metal saw, drill or punchout device; cutting with torches is prohibited.
5. Do not make cuts in the metal deck that are not shown on the approved metal deck drawings.
6. If an additional opening not shown on the approved shop drawings is required, submit a sketch, to scale, locating the required new opening and other openings and supports in the immediate area. Do not cut the opening until the sketch has been reviewed and accepted by the Contracting Officer Representative (COR). Provide additional reinforcing or framing required for the opening at no additional cost to the Government.
7. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.

N. Install shear connector studs through previously installed metal deck in conformance to AWS D1.1/D1.1M, Section 7.

3.2 CLEANING:

- A. Clean deck in accordance with manufacturer's recommendation before concrete placement.

- - - E N D - - -

SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies materials and services required for installation of cold-formed steel, including tracks and required accessories as shown and specified. This Section includes the following:

1. Exterior non-load-bearing steel stud curtain wall.
2. Steel joists.

1.2 RELATED WORK:

- A. Structural steel framing: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- B. Non-load-bearing metal stud framing assemblies: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- C. Gypsum board assemblies: Section 09 29 00, GYPSUM BOARD.

1.3 DESIGN REQUIREMENTS:

- A. Design steel in accordance with American Iron and Steel Institute Publication "Specification for the Design of Cold-Formed Steel Structural Members", except as otherwise shown or specified.
- B. Structural Performance: Engineer, fabricate and erect cold-formed metal framing with the minimum physical and structural properties indicated.

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 steel unit layout, connections to supporting members, and information necessary to complete installation as shown and specified.

C. Manufacturer's Literature and Data: Showing steel component sections and specifying structural characteristics.

1.5 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 Iron and Steel Institute (AISI):

Specification and Commentary for the Design of Cold-Formed Steel Structural Members (1996)

C. American Society of Testing and Materials (ASTM):

A36/A36M-08Standard Specifications for Carbon Structural Steel

A123/A123M-09Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A153/A153M-09Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A307-10Standard Specifications for Carbon Steel Bolts and Studs

A653/A653M-10Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C955Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

C1107/C1107M-08Standard Specifications for Packaged Dry,
Hydraulic-Cement Grout (Non-shrink)

E488-96 (R2003)Standard Test Methods for Strength of
Anchors in Concrete and Masonry Elements

E1190-95 (R2007)Standard Test Methods for Strength of
Power-Actuated Fasteners Installed in
Structural Members

D. American Welding Society (AWS):

D1.3/D1.3M-08Structural Welding Code-Sheet Steel

E. Military Specifications (Mil. Spec.):

MIL-P-21035BPaint, High Zinc Dust Content, Galvanizing
Repair

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Sheet Steel for joists, studs and accessories 16 gage and
heavier: ASTM A653, structural steel, zinc coated G90, with a
yield of 340 MPa (50 ksi) minimum.

B. Sheet Steel for joists, studs and accessories 18 gage and
lighter: ASTM A653, structural steel, zinc coated G90, with a
yield of 230 MPa (33 ksi) minimum.

C. Galvanizing Repair Paint: MIL-P-21035B.

2.2 WALL FRAMING:

A. Steel Studs: Complying with ASTM C 955. Manufacturer's standard
C-shaped steel studs of web depth indicated, with lipped flanges,
and complying with the following:

1. Minimum Base-Steel Thickness (uncoated): as indicated on
drawings.

2. Flange Width: as indicated on drawings.

3. Web: Punched.

B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, of web depths indicated, with straight flanges, and complying with the following:

1. Design Uncoated-Steel Thickness: Matching steel studs.
2. Flange Width: Manufacturer's standard deep flange where indicated, standard flange elsewhere.

2.3 JOIST FRAMING:

A. Steel Joists: Manufacturer's standard C-shaped steel joists, unpunched, of web depths indicated, with lipped flanges, and complying with the following:

1. Minimum Base-Steel Thickness: as indicated on drawings.
Design Thickness: as indicated on drawings.

2. Flange Width: as indicated on drawings

B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, unpunched, of web depths indicated, with straight flanges, and complying with the following:

1. Design Thickness: Matching steel joists.
2. Flange Width: as indicated on drawings.

2.4 FRAMING ACCESSORIES:

A. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength of 230 MPa (33 ksi).

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.

3. Web stiffeners.
4. Deflection track and vertical slide clips.
5. Stud kickers and girts.
6. Joist hangers and end closures.
7. Reinforcement plates.

2.5 ANCHORS, CLIPS, AND FASTENERS:

- A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.
- B. Cast-in-Place Anchor Bolts and Studs: ASTM A307, Grade A, zinc coated by the hot-dip process according to ASTM A153.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws. Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.6 REQUIREMENTS:

- A. Welding in accordance with AWS D1.3
- B. Furnish members and accessories by one manufacturer only.

PART 3 - EXECUTION

3.1 FABRICATION:

- A. Framing components may be preassembled into panels. Panels shall be square with components attached.

- B. Cut framing components squarely or as required for attachment.
Cut framing members by sawing or shearing; do not torch cut.
- C. Hold members in place until fastened.
- D. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 - 1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 2. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- E. Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

3.2 ERECTION:

- A. Handle and lift prefabricated panels in a manner as to not distort any member.
- B. Securely anchor tracks to supports as shown.
- C. At butt joints, securely anchor two pieces of track to same supporting member or butt-weld or splice together.
- D. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.
- E. All axially loaded members shall be aligned vertically to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.

- F. Install jack studs above and below openings and as required to furnish support. Securely attach jack studs to supporting members.
- G. Install headers in all openings that are larger than the stud spacing in that wall.
- H. Attach bridging for studs in a manner to prevent stud rotation. Space bridging rows as shown.
- I. Studs in one piece for their entire length, splices will not be permitted.
- J. Provide a load distribution member at top track where joist is not located directly over bearing stud.
- K. Provide joist bridging and web stiffeners at reaction points where shown.
- L. Provide end blocking where joist ends are not restrained from rotation.
- M. Provide an additional joist under parallel partitions, unless otherwise shown, when partition length exceeds one-half joist span and when floor and roof openings interrupt one or more spanning members.
- N. Provide temporary bracing and leave in place until framing is permanently stabilized.
- O. Do not bridge building expansion joints with cold-formed metal framing. Independently frame both sides of joints.
- P. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

3.3 TOLERANCES:

- A. Vertical alignment (plumbness) of studs shall be within 1/960th of the span.

- B. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths.
- C. Spacing of studs shall not be more than 3 mm (1/8 inch) +/- from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.
- D. Prefabricated panels shall be not more than 3 mm (1/8 inch) +/- out of square within the length of that panel.

3.4 FIELD REPAIR:

Touch-up damaged galvanizing with galvanizing repair paint.

- - - E N D - - -

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies items and assemblies fabricated from metals as shown and specified.
- B. Items specified.
 - 1. Support for Wall and Ceiling Mounted Items.

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.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
 - 1. 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.

1.4 QUALITY ASSURANCE

- A. Each product type shall be the same and be made by the same manufacturer/fabricator.
- B. Assembled product to the greatest extent possible before delivery to the site.

1.5 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 of Mechanical Engineers (ASME):
 - B18.6.1-97Wood Screws
 - B18.2.2-87(R2005)Square and Hex Nuts

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

- A36/A36M-08Structural Steel
- A53-10Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
- A307-10Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
- B221-08Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
- F436-10Hardened Steel Washers
- F468-10Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
- F593-02 (R2008)Stainless Steel Bolts, Hex Cap Screws, and Studs

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural Steel: ASTM A36.
- B. Stainless Steel: ASTM A167, Type 302 or 304.
- C. Aluminum, Extruded: ASTM B221, Alloy 6063-T5 unless otherwise specified. For structural shapes use alloy 6061-T6 and alloy 6061-T4511.
- D. Steel Pipe: ASTM A53.
 - 1. Type S, Grade A unless specified otherwise.
 - 2. NPS (inside diameter) as shown.

2.2 HARDWARE

- A. Fasteners:
 - 1. Bolts with Nuts:
 - a. ASME B18.2.2.
 - b. ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts.
 - c. ASTM F468 for nonferrous bolts.
 - d. ASTM F593 for stainless steel.
 - 2. Screws: ASME B18.6.1.
 - 3. Washers: ASTM F436, type to suit material and anchorage.
 - 4. Nails: ASTM F1667, Type I, style 6 or 14 for finish work.

2.3 FABRICATION GENERAL

- A. 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.

B. Size:

1. Size and thickness of members as shown.
2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

C. 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 bolts: Accurately punched or drilled and 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 stainless steel connectors for removable members machine screws or bolts.

D. 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.

E. 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. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.

2. Welding:

- a. Weld in accordance with AWS.
- b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
- c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
- d. Finish welded joints to match finish of adjacent surface.

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. 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. The fit of components and the alignment of holes shall 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.

F. Finish:

- 1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
- 2. Aluminum: NAAMM AMP 501.
 - a. Mill finish, AA-M10, as fabricated, use unless specified otherwise.
 - b. Clear anodic coating, AA-C22A41, chemically etched medium matte, with Architectural Class 1, 0.7 mils or thicker.
 - c. Colored anodic coating, AA-C22A42, chemically etched medium matte with Architectural Class 1, 0.7 mils or thicker.
 - d. Painted: AA-C22R10.
- 3. Steel and Iron: NAAMM AMP 504.
 - a. 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.

b. Shop Prime Painting:

1) Surfaces of Ferrous metal:

- a) Items not specified to have other coatings.
- b) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
- c) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
- d) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.

2) Non ferrous metals: Comply with MAAMM-500 series.

4. Stainless Steel: NAAMM AMP-504 Finish No. 4.

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 Wall Mounted Items:

1. For items supported by metal stud partitions.
2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.
3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
4. Steel hat channels where shown. Flange cut and flattened for anchorage to stud.

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. Field weld in accordance with AWS.
 1. Design and finish as specified for shop welding.
 2. Use continuous weld unless specified otherwise.

- C. 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.
- D. 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.
- E. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.
- F. Secure escutcheon plate with set screw.

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 steel plate or hat channels to studs as detailed.
- B. Supports for Wall Mounted items:
 - 1. Locate center of support at anchorage point of supported item.
 - 2. Locate supports where required for items shown.

3.3 STEEL COMPONENTS FOR MILLWORK ITEMS

- A. Coordinate and deliver to Millwork fabricator for assembly where millwork items are secured to metal fabrications.

- - END - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies wood blocking, framing, fire treated plywood, furring, nailers, and rough hardware.

1.2 RELATED WORK:

- A. Sustainable design requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Postconsumer and preconsumer recycled content as specified in PART 2 - PRODUCTS.
 - 2. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
 - 3. For composite wood products, submit documentation indicating that product contains no added urea formaldehyde.
- C. Shop Drawings showing framing connection details, fasteners, connections and dimensions.
- D. Manufacturer's Literature and Data:
 - 1. Submit data for lumber, panels, hardware and adhesives.
 - 2. Submit data for wood-preserved treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 3. Submit data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 4. For products receiving a waterborne treatment, submit statement that moisture content of treated materials was reduced to levels specified before shipment to project site.

E. Manufacturer's certificate for unmarked lumber.

1.4 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 152 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.

1.5 QUALITY ASSURANCE:

- A. Installer: A firm with a minimum of three (3) years' experience in the type of work required by this section.

1.6 GRADING AND MARKINGS:

- A. Any unmarked lumber or plywood panel for its grade and species will not be allowed on VA Construction sites for lumber and material not normally grade marked, provide manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material meet the specified the specified requirements.

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Forest and Paper Association (AFPA):
 - NDS-15National Design Specification for Wood Construction
 - WCD1-01Details for Conventional Wood Frame Construction
- C. American Institute of Timber Construction (AITC):
 - A190.1-07Structural Glued Laminated Timber
- D. American Society of Mechanical Engineers (ASME):
 - B18.2.1-12(R2013)Square and Hex Bolts and Screws
 - B18.2.2-10Square and Hex Nuts
 - B18.6.1-81(R2008)Wood Screws
- E. American Plywood Association (APA):
 - E30-11Engineered Wood Construction Guide

F. ASTM International (ASTM):

A653/A653M-13Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process

C954-11Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness

C1002-14Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs

D198-14Test Methods of Static Tests of Lumber in Structural Sizes

D2344/D2344M-13Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates

D2559-12aAdhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions

D3498-03 (R2011)Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems

D6108-13Test Method for Compressive Properties of Plastic Lumber and Shapes

D6109-13Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products

D6111-13aTest Method for Bulk Density and Specific Gravity of Plastic Lumber and Shapes by Displacement

D6112-13Test Methods for Compressive and Flexural Creep and Creep-Rupture of Plastic Lumber and Shapes

F844-07a (R2013)Washers, Steel, Plan (Flat) Unhardened for General Use

F1667-13Nails, Spikes, and Staples

G. American Wood Protection Association (AWPA):

AWPA Book of Standards

H. Commercial Item Description (CID):

- A-A-55615Shield, Expansion (Wood Screw and Lag Bolt Self
Threading Anchors)
- I. Forest Stewardship Council (FSC):
FSC-STD-01-001 (Ver. 4-0) FSC Principles and Criteria for Forest
Stewardship
- J. Military Specification (Mil. Spec.):
MIL-L-19140ELumber and Plywood, Fire-Retardant Treated
- K. Environmental Protection Agency (EPA):
40 CFR 59 (2014)National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products
- L. Truss Plate Institute (TPI):
TPI-85Metal Plate Connected Wood Trusses
- M. U.S. Department of Commerce Product Standard (PS)
PS 1-95Construction and Industrial Plywood
PS 20-10American Softwood Lumber Standard
- N. ICC Evaluation Service (ICC ES):
AC09Quality Control of Wood Shakes and Shingles
AC174Deck Board Span Ratings and Guardrail Systems
(Guards and Handrails)

PART 2 - PRODUCTS

2.1 LUMBER:

- A. Unless otherwise specified, each piece of lumber must bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.
1. Identifying marks are to be 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 AFPA NDS 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 7584 kPa (1100 PSI).
3. Furring, blocking, nailers and similar items 101 mm (4 inches) and narrower Standard Grade; and, members 152 mm (6 inches) and wider, Number 2 Grade.
4. Board Sub-flooring: Shiplap edge, 25 mm (1 inch) thick, not less than 203 mm (8 inches) wide.

D. Sizes:

1. Conforming to PS 20.
2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

E. Moisture Content:

1. Maximum moisture content of wood products is to be as follows at the time of delivery to site.
 - a. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
 - b. Lumber over 50 mm (2 inches) thick: 25 percent or less.

F. Fire Retardant Treatment:

1. Comply with Mil Spec. MIL-L-19140.
2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

G. Preservative Treatment:

1. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 610 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members provided in connection with roofing and flashing materials.
2. Treat other members specified as preservative treated (PT).
3. Preservative treat by the pressure method complying with AWPA Book use category system standards U1 and T1, except any process involving the use of Chromated Copper Arsenate (CCA) or other agents classified as carcinogenic for pressure treating wood is not permitted.

2.2 PLYWOOD:

- A. Comply with PS 1.

- 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. Telecommunication Room plywood
 - 1. 3/4" A/C fire treated plywood

2.3 ROUGH HARDWARE AND ADHESIVES:

- A. Anchor Bolts:
 - 1. ASME B18.2.1 and ASME B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
 - 2. Extend at least 203 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).
- B. Miscellaneous Bolts: Expansion Bolts: C1D A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Provide 13 mm (1/2 inch) bolt unless shown otherwise.
- C. Washers
 - 1. ASTM F844.
 - 2. Provide zinc or cadmium coated steel or cast iron for washers exposed to weather.
- D. Screws:
 - 1. Wood to Wood: ASME B18.6.1 or ASTM C1002.
 - 2. Wood to Steel: ASTM C954, or ASTM C1002.
- E. Nails:
 - 1. Size and type best suited for purpose unless noted otherwise.
Provide aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.
 - 2. 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.
 - f. Provide special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.

1. Fabricate of ASTM A653/A653M, Grade A; steel sheet not less than 1.3 mm (0.052 inch) thick unless specified otherwise. Apply standard plating to steel timber connectors after punching, forming and assembly of parts.
2. Framing Angles: Angle designed with bendable legs to provide three (3) way anchors.
3. Straps:
 - a. Designed to provide wind and seismic ties with sizes as shown or specified.
 - b. Strap ties not less than 32 mm (1-1/4 inches) wide.
 - c. Punched for fastener.
4. Metal Bridging:
 - a. V shape deformed strap with not less than two (2) nail holes at ends, designed to nail to top and side of framing member and bottom and side of opposite member.
 - b. Not less than 19 by 127 mm (3/4 by 5 inches) bendable nailing flange on ends.
 - c. Fabricated of 1 mm (0.04 inch) minimum thick sheet.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

- A. Conform to applicable requirements of the following:
 1. AFPA NDS for timber connectors.
 2. AITC A190.1 Timber Construction Manual for heavy timber construction.
 3. AFPA WCD1 for nailing and framing unless specified otherwise.
 4. APA for installation of plywood or structural use panels.
 5. TPI for metal plate connected wood trusses.
- B. Fasteners:
 1. Nails.
 - a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA WCD1 where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
 - b. Use special nails with framing connectors.
 - c. For sheathing and subflooring, select length of nails sufficient to extend 25 mm (1 inch) into supports.

- d. Use 8d or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.
 - e. Use 16d or larger nails for nailing through 50 mm (2 inch) thick lumber.
 - f. Select the size and number of nails in accordance with the Nailing Schedule except for special nails with framing anchors.
 - g. Nailing Schedule; Using Common Nails:
 - 1) Joist bearing on sill or girder, toe nail three (3) 8d nails or framing anchor.
 - 2) Bridging to joist, toe nail each end two (2) 8d nails.
 - 3) Ledger strip to beam or girder three (3) 16d nails under each joint.
2. Bolts:
- a. Fit bolt heads and nuts bearing on wood with washers.
 - b. Countersink bolt heads flush with the surface of nailers.
 - c. Embed in concrete and solid masonry or provide expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
 - d. Provide toggle bolts to hollow masonry or sheet metal.
 - e. Provide bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 610 mm (24 inch) intervals between end bolts. Provide clips to beam flanges.
3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
- a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
 - b. ASTM C954 for steel over 0.84 mm (0.033 inch) thick.
4. Power actuated drivepins may be provided where practical to anchor to solid masonry, concrete, or steel.
5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Provide metal plugs, inserts or similar fastening.
6. Screws to Join Wood:
- a. Where shown or option to nails.
 - b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
 - c. Spaced same as nails.
7. Installation of Timber Connectors:

- a. Conform to applicable requirements of the AFPA NDS.
- b. Fit wood to connectors and drill holes for fasteners so wood is not split.
- C. Cut notch, or bore in accordance with AFPA WCD1 passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.
- D. Blocking Nailers, and Furring:
 - 1. Install furring, blocking, nailers, and grounds where shown.
 - 2. Provide longest lengths practicable.
 - 3. Provide fire retardant treated wood blocking where shown at openings and where shown or specified.
 - 4. Layers of Blocking or Plates:
 - a. Stagger end joints between upper and lower pieces.
 - b. Nail at ends and not over 610 mm (24 inches) between ends.
 - c. Stagger nails from side to side of wood member over 127 mm (5 inches) in width.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies finish carpentry and custom interior millwork.
- B. Items specified.
 - Hard Wood Trim and Moldings

1.2 RELATED WORK

- A. Fabricated Metal Brackets: Section 05 50 00, METAL FABRICATIONS.
- B. Color and Texture of Finish: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Duplex Outlets and Communication Cabling: Division 26, ELECTRICAL.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
 - 1. Millwork items - Half full size scale for sections and details 1:50 (1/4-inch) for elevations and plans.
 - 2. Show construction and installation.
- C. Samples:
 - 1. Hardwood trim and moldings
- D. Certificates:
 - 1. Indicating moisture content of materials meet the requirements specified.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Protect 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 building designated by COR. Store at a minimum temperature of 70° F for not less than 10 days before installation.
- C. Store materials in such manner as to provide air circulation around surfaces of each piece.

1.5 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 of Testing and Materials (ASTM):

- B221-08Aluminum and Aluminum-Alloy Extruded Bars,
Rods, Wire, Profiles, and Tubes
- E84-10Surface Burning Characteristics of Building
Materials
- C. American Hardboard Association (AHA):
A135.4-04Basic Hardboard
- D. Builders Hardware Manufacturers Association (BHMA):
A156.9-03Cabinet Hardware
A156.11-10Cabinet Locks
A156.16-08Auxiliary Hardware
- E. Hardwood Plywood and Veneer Association (HPVA):
HP1-09Hardwood and Decorative Plywood
- F. National Particleboard Association (NPA):
A208.1-09Wood Particleboard
- G. Architectural Woodwork Institute (AWI):
AWI-09Architectural Woodwork Quality Standards and
Quality Certification Program
- H. National Electrical Manufacturers Association (NEMA):
LD 3-05High-Pressure Decorative Laminates
- I. Federal Specifications (Fed. Spec.):
A-A-1922AShield Expansion
A-A-1936Contact Adhesive
FF-N-836DNut, Square, Hexagon Cap, Slotted, Castle
FF-S-111D(1)Screw, Wood
MM-L-736(C)Lumber, Hardwood

PART 2 - PRODUCTS

2.1 WOOD TRIM

Match shapes, species and finishes indicated on the drawings.

2.2 LUMBER

- A. Grading and Marking:
1. Lumber shall bear the grade mark, stamp, or other identifying marks indicating grades of material.
 2. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection

organization, usage of authorized identification, and information included in the identification.

3. The inspection agency for lumber shall be approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Sizes:

1. Lumber Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which product is produced.
2. Millwork, standing and running trim, and rails: Actual size as shown or specified.

C. Softwood: PS-20, exposed to view appearance grades:

1. Use C select or D select, vertical grain for transparent finish including stain transparent finish.
2. Use Prime for painted or opaque finish.

2.3 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. Galvanized where specified.
2. Use galvanized coating on ferrous metal for exterior work unless non-ferrous metals or stainless is used.
3. Fasteners:
 - a. Bolts with Nuts: FF-N-836.
 - b. Expansion Bolts: A-A-1922A.
 - c. Screws: Fed. Spec. FF-S-111.

2.4 MOISTURE CONTENT

A. Moisture content of lumber and millwork at time of delivery to site.

1. Interior finish lumber, trim, and millwork 1-1/4 inches or less in nominal thickness: 12 percent on 85 percent of the pieces and 15 percent on the remainder.

2.5 FABRICATION

A. General:

1. Except as otherwise specified, use AWI Custom Grade for architectural woodwork.
2. Finish woodwork shall be free from pitch pockets.

3. Except where special profiles are shown, trim shall be standard stock molding and members of the same species.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

- A. Maintain millwork storage areas at a minimum temperature of 70° F for not less than 10 days before installation of interior millwork.

3.2 INSTALLATION

- A. General:
 1. Millwork receiving transparent finish shall be primed and back-painted on concealed surfaces. Set no millwork until primed and back-painted.
 2. Secure trim with fine finishing nails, screws, or glue as required.
 3. Set nails for putty stopping. Use washers under bolt heads where no other bearing plate occurs.
 4. Coordinate with electrical work for installation of fixtures and service connections in millwork items.
 5. Plumb and level items unless shown otherwise.
 6. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.

- - END - -

SECTION 072100
THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation (EPS). (INSUL-1)
2. Molded (expanded) polystyrene foam-plastic board insulation (XPS). (INSUL-2)
3. Polyisocyanurate foam-plastic board insulation. (INSUL-3)
4. Mineral-wool blanket insulation. (INSUL-4)
5. Mineral-wool board insulation. (INSUL-5)
6. Spray-applied cellulosic insulation. (INSUL-6)

B. Related Requirements:

1. Roofing specification section.
2. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Extruded polystyrene foam-plastic board insulation.
2. Polyisocyanurate foam-plastic board insulation.
3. Mineral-wool blanket insulation.
4. Mineral-wool board insulation.
5. Spray-applied cellulosic insulation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

- A. Extruded Polystyrene Board Insulation (EPS), Type X (INSUL-1) : ASTM C578, Type X, 15-psi minimum compressive strength; unfaced.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. DuPont de Nemours, Inc.
 - c. Owens Corning.
 - d. The Dow Chemical Company.
 - 2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
 - 3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
 - 4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - 5. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.2 MOLDED (EXPANDED) POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

- A. Molded (Expanded) Polystyrene Board Insulation (XPS), Type IX (INSUL 2) : ASTM C578, Type IX, 25-psi minimum compressive strength.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Atlas Molded Products, a division of Atlas Roofing Corporation.
 - b. DiversiFoam Products.
 - c. Insulfoam; Carlisle Construction Materials Company.
 - d. Plymouth Foam, Inc.
 - 2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.3 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

- A. Polyisocyanurate Board Insulation, Glass-Fiber-Mat Faced (INSUL-3) : ASTM C1289, glass-fiber-mat faced, Type II, Class 2.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.
 - b. Firestone Building Products.
 - c. Hunter Panels.
 - d. Johns Manville; a Berkshire Hathaway company.
 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 3. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.4 MINERAL-WOOL BLANKET INSULATION

- A. Mineral-Wool Blanket Insulation, Unfaced (INSUL-4) : ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Owens Corning.
 - c. ROCKWOOL.
 2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
 3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
 4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.5 MINERAL-WOOL BOARD INSULATION

- A. Mineral-Wool Board Insulation, Type III, Unfaced (INSUL-5) : ASTM C612, Type III; passing ASTM E136 for combustion characteristics.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Owens Corning.
 - c. ROCKWOOL.
 2. Nominal Density: 8 lb/cu. ft..
 3. Flame-Spread Index: Not more than 15 when tested in accordance with ASTM E84.
 4. Smoke-Developed Index: Not more than zero when tested in accordance with ASTM E84.
 5. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.6 SPRAY-APPLIED CELLULOSIC INSULATION

- A. Self-Supported, Spray-Applied Cellulosic Insulation (INSUL-6) :
ASTM C1149, Type II (materials containing a dry adhesive activated by water during installation; intended only for enclosed or covered applications), chemically treated for flame-resistance, processing, and handling characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Greenfiber, LLC.
 - b. Hamilton Manufacturing, Inc. (HMI).
 - c. International Cellulose Corp.

2.7 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
 - 1. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Install insulation with manufacturer's R-value label exposed after insulation is installed.
- D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

- E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. Insulate as indicated in drawings.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. Insulate as indicated in drawings.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.5 INSTALLATION OF CONTINUOUS PERIMETER WALL BOARD INSULATION

- A. Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.
 - 1. Fit courses of insulation between masonry wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
 - 2. Press units firmly against inside substrates.

3.6 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- B. Spray-Applied Cellulosic Insulation: Apply spray-applied insulation according to manufacturer's written instructions.
 1. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked.
 2. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

3.7 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072100.10

ROOF INSULATION BAFFLES AND VENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Roof Insulation Baffles and Vents.

1.2 RELATED SECTIONS

- A. Section 076000 - Flashing and Sheet Metal.

1.3 REFERENCES

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Extruded and formed polystyrene vents have a flame-spread index of 5 or less and smoke developed of 75 or less when tested in accordance with ASTM E 84.

1.5 SUBMITTALS

- A. Submit under provisions of Section 013000 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
- C. Preparation instructions and recommendations.
- D. Storage and handling requirements and recommendations.
- E. Installation methods.
- F. Verification Samples: For each product specified, two full size samples representing actual product.
- G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures attic insulation baffles and vents of the type specified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. For on-site storage longer than two weeks, slit packaging on 4 sides to allow the product to breathe, and then completely covered with a breathable tarpaulin.
- C. Protect products from open flame and keep dry at all times.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: ADO Products as listed below or approved equal.
- B. Requests for substitutions will be considered in accordance with provisions of Section 016000 - Product Requirements.

2.2 PRODUCTS

- A. Durovent: One-piece vent of extruded polystyrene foam (EPS) with lightweight waterproof air channel and wide stapling flanges.
- B. Joist Spacing: 16 or 24 inches O.C.
- C. Size:
 - 1. Width: 22 inches perforated at centerline to fit joist spacing.
 - 2. Vent Body Length: 48 inches.
 - 3. Air Channel Depth: 1.4 inches
 - 4. Net Free Area: 18.7 per square inch.
- D. Durovent Baffle: One-piece friction fit vent and baffle of extruded polystyrene foam (EPS). Durovent Baffle is waterproof and will block moisture and wind from penetrating the attic.
- E. Joist Spacing: 24 inches O.C.
 - 1. Baffle is suitable for heel height of 7-3/8 inches to 11-3/8 inches.
 - 2. Size:
 - a. Width: 22.5 inches.
 - b. Total Length with baffle: 46 inches
 - c. Vent Body Length: 36 inches.

- d. Air Channel Depth: 1.13 inches
- e. Net Free Area: 25.3 per square inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify deck, adjacent materials, and structural backing is dry and ready to receive vents and insulation.
- C. Verify that there is an unobstructed pathway to the truss channel from within the structure.
- D. Verify deck surface is flat, free of fins or protrusions and irregularities.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Durovent Ventilation Channel:
 - 1. Place ventilation channel over top plate, approximately 1 inch.
 - 2. Secure ventilation channel to roof deck with staples in the stapling flanges
 - 3. Install attic insulation tight against the ventilation channel.
 - 4. One ventilation channel per rafter or truss cavity is recommended
 - 5. Cathedral ceilings require a continuous run of ventilation channels from intake to exhaust leaving a 1 inch gap between each vent.
- C. Durovent Baffle:
 - 1. Insert the ventilation channel in the truss opening and slide the vent toward the top plate.
 - 2. Position baffle and pre-fold portion of the ventilation channel to fit the heel height. Baffle section should be vertical and the Durovent Baffle logo should be visible. You may need to remove the perforated pre-folded pieces attached to the tail portion if the heel height exceeds 7-3/8 inches, allowing for a portion of the pre-folded tail (1 inch increments) to be used as part of the baffle.

3. Staple the ventilation channel and baffle flanges to the sides of the trusses once the baffle (block) is vertically aligned with exterior of the wall top plate and the cones are touching the roof deck across the vent body. Finish by tacking the pre-folded tail to the top of the wall top plate.
4. One ventilation channel per rafter or truss cavity is recommended

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Repair or replace damaged products before Substantial Completion.

END OF SECTION 072100.10

SECTION 073119
FIBER CEMENT WALL PANELS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: The Work of this Section includes Fiber cement panels of the following types:
 - 1. Through color high density fiber cement panels with semi-transparent colored finish which results in the structure of fiber cement material shining through.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Carefully examine Contract Documents for requirements that affect work of this section.
- B. Other specifications sections that directly relate to work of this section include, but are not limited to, the following:
 - 1. Section 054000 - Cold-Formed Metal Framing.
 - 2. Section 072100 - Thermal Insulation.
 - 3. Air Barriers Section: Exterior wall air and moisture barrier

1.4 SUBMITTALS

- A. Products Submittals shall be per Section 013300 - Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including, but not limited to:
 - 1. Preparation instructions and recommendations for panels.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods for the supporting framework and the panels.
- C. Shop Drawings: Provide detailed drawings of non-standard applications of fiber cement materials which are outside the scope of the standard details and specifications provided by the manufacturer.
- D. Code Compliance: Documents showing product compliance with local building code shall be submitted prior to the bid. These documents shall

include, but not be limited to, appropriate Evaluation Reports and/or test reports supporting the use of the product.

- E. Engineering Calculations: Submit engineering calculations as required by the local building code, showing that the installed panels and attachment system meets the wind load requirements for the project.
- F. Verification Samples: For each finish product specified, two samples, size 11 11/16" inches (305 mm) x 11 3/4" (297mm), representing actual product, color, and patterns.
- G. Operation and Maintenance Data: Submit operation, maintenance, and cleaning information for products covered under this section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: All products listed in this section are to be installed by a single installer trained and approved by the manufacture or representative.
- B. Color Evaluation: No visible change, 2000 hours of accelerated weathering with color evaluation when calculated to ASTM D 2244-09a.
- C. Mock-Up: Provide a full size mock-up, minimum 30 sf for evaluation of surface preparation techniques and application workmanship. Mock-up shall include a corner, window sill, jamb and head condition, wall base and wall-roof intersection.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Moving panels that are stacked on pallets should be done with a forklift with wide fork setting or a crane. Ensure the panels are secured to the pallet in a way that will not cause damage. Stacks should be transported under a waterproof cover.
- B. All panel materials must be stored flat on pallets, inside and undercover in dry conditions, protected from weather both rain and direct sunlight and other trades. Stack the pallets in a way so that the panels are ventilated.
- C. Always lift panels off of each other, never slide them over one another, since scratching may occur.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside

manufacturer's absolute limits or which could involve life safety situations.

- B. Field Measurements: Verify actual measurements/openings by field measurements performed by the installer prior to release for fabrication. The General Contractor or Installer shall be responsible for existing site dimensions. Recorded measurements shall be indicated on shop drawings based on field measurements provided by the installer. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.8 WARRANTY

- A. Warranty: At project closeout, provide manufacturer's limited ten (10) year warranty covering defects in materials. Warranty is only available when material is installed by an installation contractor trained and approved by the manufacturer's representative.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design, As indicated on drawings or VA approved equal.

- 1. Equitone distribution supplier:

Tom Lally
Office: 360-825-2404 Fax: 360-825-2504
1724 Garrett Street, Ste B Enumclaw, WA 98022
www.ams-wa.com

- B. Requests for substitutions will be considered in accordance with provisions of Section 016000 - Product Requirements.

2.2 FIBER CEMENT WALL PANELS (FC-1, FC-2)

- A. Through Color High Density Fiber Cement Panels:

- 1. Product: Fiber Cement Panel as indicated in drawings or VA approved equal.
 - a. Application: Exterior.
 - b. Thickness: 5/16" - 3/8"
 - c. Finish: Indicated product is a through colored panel with no coating. The surface of the sheet is characterised by fine sanding lines and white spots. The rear receives no back-sealing coating. The board receives a hydrophobation which prevents moisture ingress into the core of the panel.
 - d. Physical Characteristics:
 - e. EN 12467 'Fiber-cement flat sheets'.
 - f. Density: Minimum 1.58 kg/m³ (98.6 lb/ft³)

- g. Bending strength @ ambient, perpendicular: 32.0 N/mm² (4,641 lbf/in²)
- h. Bending strength @ ambient, parallel: 22N/mm². (3,190 lbf/in²)
- i. MOE @ ambient, perpendicular: > 14,000N/mm². (> 2,030,532 lbf/in²)
- j. Hygric movement 0-100%, mean: 1.60 mm/m.
- k. Porosity 0-100%: < 25 %.
- l. Durability classification (EN 12467): Category A.
- m. Strength classification (EN 12467): Class 5.
- n. Fire reaction (EN 13501-1): A2-s1-d0;
- o. Impermeability test: OK.
- p. Warm water test: OK.
- q. Soak dry test: OK.
- r. Freeze thaw test: OK.
- s. Thermal conductivity: 0.39 W/mK.
- t. ASTM C1185, ASTM C1186 Testing
- u. ASTM C 1185 Section 5 Flexural Strength Modulus of Rupture - Pass Grade IV
- v. ASTM C 1185 Section 6 Density 101 lb/ft³ (1619.8 kg/m³)
- w. ASTM C 1185 Section 7 Dimensional Measurements
 - 1) Length Pass
 - 2) Width Pass
 - 3) Thickness Pass
 - 4) Squareness Pass
 - 5) Edge Straightness Pass
- x. ASTM C 1185 Section 8 Moisture Movement
 - 1) 23±2°C, 30±2%RH 0%
 - 2) 23±3°C, 90±5%RH 0.02%
- y. ASTM C 1185 Section 9 Water Absorption 19%
- z. ASTM C 1185 Section 10 Moisture Content 5.9%
- aa. ASTM C 1185 Section 11 Water Tightness Pass
- bb. ASTM C 1185 Section 12 Freeze/Thaw (Cladding Products) Pass
- cc. ASTM C 1185 Section 13 Warm Water Pass

2.3 MISCELLANEOUS CLADDING MATERIALS

- A. Perforated Insect/Vermin Screen: Manufacturer's standard.
- B. Building Wrap: Approved Building Wrap complying with local codes for product and installation requirements.
- C. Aluminum Joint Closures and Decorative Corner Profiles: Manufacturer's standard products as detailed. Maximum thickness of non structural finishing profile to be 0.8 mm or 21 gauge.
- D. Panel Fastening Options: {Face Fixed Rivets}, {Face Fixed Screws}, {Tergo+ Mechanical Secret Fixing}, {Adhesive Fixing}

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean panel surfaces thoroughly prior to installation. Remove any cutting or drilling dust from the surface of the panel using a micro-soft cloth. {This is especially important when panels are being adhesively fixed}
- B. Prepare surfaces using the methods recommended by Equitone for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved submittals.
- B. For exterior applications, comply with local codes and structural engineer's fastening calculations along with manufacturer's recommendations for fastener spacing.

3.4 EXTERIOR CLADDING FOR RAINSCREEN APPLICATIONS

- A. Detailing Requirements:
 - 1. Air space inlets and outlets are required at top and bottom of building or wall termination and shall be equivalent to a continuous 1/2" to 3/4" (12 mm to 18 mm) to facilitate airflow behind the panels. Do not block vertical airflow at windows, doors, eaves, or at the base of the building. Airflow shall be continuous from bottom to top so there is air movement behind each panel. The minimum cavity width should be at least 25/32" (20mm) for facades up to 33' (10m) high. For facades between 66'-165' (20-50 m) the cavity width needs to increase to 1 3/16" (30mm). Air flow behind the fiber cement panels is critical to the performance of the rain screen constructions.
 - 2. Fasteners in profile shall accommodate thermal expansion/contraction of metal and not interfere with panel application.
 - 3. Install panels starting from top of building and work down the facade.
 - 4. For straight walls, start panel installation in center and work outward.
 - 5. For walls with inside corners, start installation at corner and work across wall.

6. Pattern: Straight pattern with vertical panels. Panel size as indicated.
7. Pattern: Straight pattern with horizontal panels. Panel size as indicated.
8. Pattern: Semi pattern with horizontal panels. Panel size as indicated.

- B. Rain Screen Installation: Comply with manufacturer's installation requirements.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 073119

SECTION 074210.10
COMPOSITE FRAMING SUPPORT SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Continuous insulation (CI) steel and fiber reinforced polymer composite metal hybrid (CMH) framing support (CFS) system integrated with fiber cement panels or exterior wall cladding.

- 1. Substrate: Exterior sheathing over metal stud framing or .

1.2 RELATED REQUIREMENTS

- A. Section 054000 - Cold-Formed Metal Framing: Metal stud substrate support framing
- B. Section 079200 - Joint Sealants: Perimeter sealant

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate construction of wall cladding support system over substrate indicated for proper drainage, flashing, trim, back-up support, soffits, and other related Work.
 - 1. Review and finalize construction schedule.
 - 2. Verify availability of materials, installer's personnel, equipment, and facilities needed to maintain schedule.
 - 3. Review means and methods related to installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment and attachment to structural support system.
 - 5. Review flashings, wall cladding details, wall penetrations, drainage plane, openings, and condition of other construction that affects this Work.
 - 6. Review temporary protection requirements for during and after installation of this Work.

1.4 SUBMITTALS

- A. Product Data: Submit for each type of product indicated; include construction details, material descriptions, dimensions of individual components and profiles, and accessories as necessary for complete fully functioning and assembled system.
- B. Either reference testing requirements provided in other section that specifies wall cladding/veneer system or under Performance Requirements

article provided in PART 2 of this section. Coordinate this information in compliance with project requirements.

- C. Test and Inspection Reports: Submit test and inspection reports on each type of wall cladding/veneer system based on evaluation of comprehensive tests performed by nationally recognized testing agency.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Installer: Company specializing in performing work of this section and the following:
 - 1. Install system in strict compliance with manufacturer's installation instructions.
- B. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a licensed Structural Engineer experienced in design for this type of Work and licensed in State that Project is located. Engineering information provided shall be signed and verified by licensed Structural Engineer.
- C. Source Limitations: Obtain continuous insulation (CI) and CFS system from single source and single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original unopened containers and packaging with labels clearly identifying product name and manufacturer.
- B. Deliver components and other manufactured items or accessories without damage or deformation.
- C. Storage: Store materials in clean, dry, and level interior areas or outdoor areas for limited duration in accordance with manufacturer's written instructions.
- D. Protect components and auxiliary accessories during transportation, handling, and installation from moisture, excessive temperatures and other construction operations in accordance with manufacturer's written instructions.
- E. Handle components in strict compliance with manufacturer's written instructions and recommendations, and in a manner to prevent bending, warping, twisting, and surface, edge or corner damage.

1.7 SITE CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work in accordance with manufacturer's written installation instructions and warranty requirements.

1.8 WARRANTY

- A. CI and CFS System Warranty: Provide written warranty by manufacturer and installer agreeing to correct defects in manufacturing within a five year or period after Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design: Advanced Architectural Products (A2P): SMARTci 2-in-1 System
 - 1. Strongwell
 - 2. Other products shall be pre-submitted and approved products that meet materials and performance requirements with specified and validated third party testing.

2.2 DESCRIPTION

- A. CFS system components anchored to exterior sheathing over metal stud framing or .
- B. Install CI panels and CFS system components as indicated on drawings in compliance with specified requirements.
- C. CI and CFS systems are intended to be installed upon load bearing wall framing substrate system without metallic thermal bridging. Coordinate this Work with other trades affected by this Work to minimize penetrations by thermal conductors throughout overall wall cladding system.

2.3 PERFORMANCE REQUIREMENTS

- A. Structural: Provide system tested in accordance with ASTM E330/E330M and certified to be without permanent deformation or failure of structural members in accordance with design wind velocities for project geographic location and probability of occurrence based on data from wind velocity maps provided in ASCE 7 and as approved by authorities having jurisdiction (AHJ).

1. Provide finite element analysis (FEA) to model and evaluate areas of the longest composite girt cantilever span possible between intermediate framing members/attachment.
 - a. FEA shall include max dead load and wind load conditions
 - b. FEA shall include point loads representative of fastener locations
 - c. Maximum directional stresses in model shall have a safety factor of 4 or greater.
 - d. Stresses shall be indicated and analyzed in 3 directions.
 - e. FEA shall accurately replicate the wall system and physical loading dynamics.
 - f. Report shall be furnished with the submittal.
 - g. FEA shall be approved by a licensed PE.
 2. Butt joints (non-interlocking joints) of adjacent girts shall be installed on a minimum surface width of 3" or double stud condition to accommodate proper fastener margins to composite.
- B. System Thermal Design: Ensure installed CI and CFS system, opening trim, sub-framing, clips and cladding attachment does not have thermal bridging of fasteners or framing that creates a continuous metal path from exterior surface of insulation to interior face of insulation.
1. System thermal design shall meet or exceed thermal design requirements in compliance with ASHRAE 90.1 energy code.
 2. Thermal Resistance: Wall assembly R Value of as indicated on drawings.
 3. Thermal Performance Test: Provide thermal resistance (R-value) indicated, in compliance with ASTM C1363, corrected to 15 mph outside and still air inside, with installed conditions including trim for openings, fastening and joints.
 - a. Provide efficiency of no less than 93 to 98 percent , with a maximum temperature differential of 18 degrees F from interior wall surface to interior wall cavity and node locations with a 70 degrees F exterior to interior wall temperature delta.
 - b. Provide test unit with at least one insulation panel horizontal and vertical joint length and height of test chamber area.
 - c. Provide finite element analysis of three-dimensional simulation of described wall assembly sealed by professional engineer in compliance with code performance requirements and exceeding it by at least 3 percent.
- C. Temperature: Comply with structural loading requirements within temperature range of minus 55 degrees F to 180 degrees F.
- D. Fire-Test-Response Characteristics: Provide composite framing support system with fire-test results indicated as determined by test standard indicated and applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.
1. Surface Burning Characteristics: In compliance with ASTM E84, for foam insulation, composite metal hybrid and interior surfaces as follows:
 - a. Flame Spread Index (FSI): 25 or less.
 - b. Smoke Developed Index (SDI): 450 or less.
 2. Comply with following Sections of IBC as indicated:

- a. Intermediate Scale Multistory Fire Test: Comply with NFPA 285 and/or IBC acceptance criteria for wall height above grade and fire separation distances, when wall type and other noted conditions require such testing or compliance with requirements as indicated.

2.4 COMPOSITE FRAMING SUPPORT (CFS) SYSTEM

- A. CFS System: Provide CFS system consisting of composite metal hybrid (CMH) subframing with recycled materials, fire retardant additives and integral continuous metal inserts the length of profile. Reinforce CFS systems with glass strand rovings used internally for longitudinal (lengthwise) strength and continuous strand glass mats or stitched reinforcements used internally for transverse (crosswise) strength.
 1. Depth of GreenGirt: as indicated on drawings.
 2. On Center Spacing: as indicated on drawings.
 3. Provide continuous non-corrosive steel insert for engagement of fasteners, 16 gage, minimum thickness, with G90 galvanized coating designation in compliance with ASTM A653/A653M.
 - a. Fully engage steel insert with adjacent CFS at ends.
 - b. Anchor sub-girts and other wall cladding support accessories to steel insert set into and part of CFS.
 4. Provide integral 3-point compression seal in CFS sections to ensure insulation panel will not dislodge.
 5. Provide integral anti-siphon grooves on exterior and interior flanges of CFS.
 6. Provide force distribution zones integrally designed into profile of CFS.
 7. Provide spline seals for adjacent insulation units into profile of CFS.
- B. Surface Burning Characteristics:
 1. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84.
 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
- C. Flammability: Comply with ASTM E84.
- D. Self-Extinguishing: Comply with ASTM D635.
- E. Profile Visual Requirements: Comply with ASTM D4385.
- F. Mechanical Strength Requirements: Provide CMH system in compliance with the performance loading criteria and specified safety factors to meet the below requirements:
- G. Barcol Hardness: 45, in accordance with ASTM D2583.
- H. Water Absorption: Less than 0.46 percent by weight, within 24 hours, tested in accordance with ASTM D570.

- I. Density: Within range of 0.062 to 0.070 lbs/cubic inch, in accordance with ASTM D792.
- J. Lengthwise Coefficient of Thermal Expansion: 7.0×10^{-6} inch/inch/degrees F, in accordance with ASTM D696.
- K. Notched Izod Impact, Lengthwise: 160 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.
- L. Notched Izod Impact, Crosswise: 100 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.

2.5 INSULATION

- A. NOTE: Mineral Wool Board insulation will be used on building #1. Reference spec Section 072100 "Thermal Insulation". Buildings #11 and #66 will use the Composite Framing Support System manufacturer's insulation specified below.
- B. Insulation Panel Edges: Provide factory formed edges on insulation panels that interlock with CFS system components.
- C. Extruded Polystyrene (XPS) Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
 - 1. Type: ASTM C578, Type IV, 25 psi compressive strength or .
 - 2. Flame Spread Index (FSI): 25 or less, tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, tested in accordance with ASTM E84.
 - 4. Comply with fire-resistance requirements, as indicated on drawings, and as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 - 5. Board Edges: Square.
 - 6. Water Absorption, Maximum: 0.3 percent, by volume; ASTM C578.
 - 7. Acceptable Products:
 - a. Dow Chemical Company (www.dow.com)
 - b. Owens Corning Corporation (www.ocbuildingspec.com)
 - c. Kingspan Insulation LLC (www.kingspan.com)

2.6 COMPOSITE MATERIAL TRIM FOR OPENINGS

- A. Composite Trim; Provide nonstructural composite trim at rough openings to properly transition CI system.
 - 1. Use trim angles and accessories sized to enclose CI system to provide thermally broken transition from opaque wall assemblies.
 - 2. Use sealant and tapes as required to transition vapor barrier from substrate onto trim.
 - 3. Trim to provide 90 degree transition of continuous insulated substrate for vapor barrier and exterior flashings.
 - 4. Trim to be covered by exterior panel construction and flashings.

5. Mechanical Strength Requirements: Provide FRP in compliance with the performance loading criteria and specified safety factors to meet the below requirements:
6. Surface Burning Characteristics:
 - a. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84.
 - b. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
7. Comply with fire-resistance requirements, as indicated on drawings, and as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
8. Water Absorption: Less than 0.46 percent by weight, within 24 hours, tested in accordance with ASTM D570.
9. Acceptable Products:
 - a. SMARTci Trim
 - b. Strongwell Trim
 - c. Alternative: Performance CI system utilizing metal trim to provide spray foam insulation at a depth of 6" extending 32" around openings to reduce thermal transfer at wall transitions.

2.7 CONTINUOUS INSULATION SYSTEM ASSEMBLY

- A. Assemble CI with CFS and trim system using manufacturer's standard procedures and processes identical to tested units and as necessary to comply with performance requirements indicated.
 1. Comply with CFS system and dimensional and structural requirements as indicated on drawings.
 2. Erect CFS system in sequence in accordance with manufacturer's standard installation procedures.
 3. Provide spray foam sealant on backside of cantilevered fasteners that completely puncture the insulation layer.
- B. Provide uninterrupted, monolithic drainage plane as required per project details.

2.8 ACCESSORIES

- A. Provide accessories necessary for complete CFS system including metal closure trim transition angle strapping tie-in brackets and similar items.
- B. Fasteners: Corrosion-resistant, self-tapping and self-drilling screws, bolts, nuts, and other fasteners as recommended by CFS system manufacturer for CMH material and project application.
 1. Cladding to CMH: Use standard self-tapping metal screws.
 2. CMH to Metal Stud Wall Framing: Use standard self-tapping metal screws.
 3. CMH to Concrete/CMU: Use standard masonry or concrete screw anchors in predrilled hole.
 4. CMH to Wood Framing: Use standard wood screw anchors.

5. DO NOT USE powder, air, or gas actuated fasteners or actuated fastener tools. DO NOT USE impact wrenches when fastening to or from the CMH.
 6. CMH attachments to follow guidelines of ASCE Structural Plastics Design Manual:
- C. Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I.
1. Refer to Drawings for thickness and Section 061000 for additional requirements.
- D. Tape: Pressure sensitive adhesive coated polypropylene woven fabric. Must be mold, water, tear and UV resistant. Must be applicable in a wide temperature range (-20 degrees F).
- E. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, square long edges, Type X fire-resistant.
1. Refer to Drawings for thickness for additional requirements.
- F. Weather Resistant Barrier (WRB): Refer to Section 072500 for requirements.
- G. Sealants: Provide sealants as recommended by CFS manufacturer for openings within CFS system and perimeter conditions.
1. Refer to Section 079200 for sealant information.
- H. Closure and Transition Accessories: Use metal angles and flat stock per standard system details.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas of this work, and project conditions with installer present for compliance with requirements for installation tolerances, substrates, CFS system conditions, and other conditions affecting performance of this Work.
- B. Examine structural wall framing to ensure that angles, channels, studs, and other structural support members have been installed within alignment tolerances required by CFS system manufacturer.
- C. Examine rough-in for components and systems penetrating CFS system to coordinate actual locations of penetrations relative to CFS systems joint locations prior to installation.
- D. Verify that mechanical and electrical services for exterior walls have been installed and tested and, if appropriate, verify that adjacent materials and finishes are dry and ready to receive insulation.

- E. Proceed with installation only after wall substrate surfaces have been properly prepared and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by CFS manufacturer for achieving best result for substrate under project conditions.
- C. Prepare sub-framing, base angles, sills, furring, and other CFS system members and provide anchorage in accordance with ASTM C754 for substrate type and wall cladding type in accordance with manufacturer's installation instructions.

3.3 INSTALLATION

- A. Accordance with manufacturer's installation instructions.
- B. Install CFS system to meet requirements of ASCE Structural Plastics Design Manual.
- C. Install system to fill-in exterior spaces without gaps or voids, and do not compress insulation panels.
- D. Trim insulation neatly to fit spaces, and insulate miscellaneous gaps and voids.
- E. Fit insulation tight in spaces and tight to exterior side of Mechanical/Electrical services within plane of insulation.
- F. Seal gaps, voids or penetrations completely with approved expandable foam sealant on exterior and interior (if visible) before enclosing wall.
- G. Provide spray foam to seal metal penetrations, including cantilevered fasteners, to prevent interstitial space condensation.
- H. Exposed insulation must be protected from open flame and kept dry at all times.
- I. Exterior wall insulation panels are not intended to be left exposed for periods of time in excess of 60 days without adequate protection.
 - 1. When extended exposure is anticipated, protect exposed insulation surfaces including corners, window and door openings with a compatible waterproof tape.
- J. Install CFS system in compliance with system orientation, sizes, and locations as indicated on drawings.

3.4 TOLERANCES

- A. Shim and align CFS system within installed tolerances of 1/4 inch in 20 feet, non-cumulative, level, plumb, and on location lines as indicated.

3.5 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Ensure that insulation panels are not exposed to moisture.
 - 1. Remove wet insulation panels or allow them to completely dry prior to installation of CFS system.
- C. Replace damaged insulation panels prior to Date of Substantial Completion.

END OF SECTION 074210.10

SECTION 07 50 05
ROOF SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Patching of existing roofing system for installing of new HVAC equipment for telecommunication rooms AND Building 157.
2. The existing roof systems vary.
3. See drawings for locations of units.
4. See specification section 07 51 13.13 and 07 52 16.11 for requirements for specific work required for each roof system.

B. Related Sections

1. Section 06 10 00: Rough Carpentry

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM D-751 - Standard Test Methods for Coated Fabrics
2. ASTM E-96 - Standard Test Methods for Water Vapor Transmission of Materials

ASTM D-1079 - Terminology Relating to Roofing and Waterproofing
3. ASTM D-204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
4. ASTM C-578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
5. ASTM C-1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
6. ASTM C-1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers

7. ASTM D-2136 - 02(2007) Standard Test Method for Coated Fabrics-Low-Temperature Bend Test
8. ASTM D-3045 - 92(2010) Standard Practice for Heat Aging of Plastics Without Load
9. ASTM D-4434/D-4434M - 2015 Standard Specification for Poly(Vinyl Chloride) Sheet Roofing
10. ASTM D-6754/D-6754M - 2010 Standard Specification for Ketone Ethylene Ester Based Sheet Roofing

B. International Building Code - 2021.

C. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual (6th Edition)

D. Underwriters Laboratories (UL) UL 790 - 2004 Standard Test Methods for Fire Tests of Roof Coverings

E. National Roofing Contractors Association (NRCA) - 2012 the NRCA Roofing Manual.

F. American National Standards Institute/Single Ply Roofing Association - ANSI/SPRI-ES-1-2003 Low Slope Roof Edge Standard

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D-1079 - 2006 and the glossary of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual for definitions of roofing terms related to this section.

B. Sheet Metal Terminology: SMACNA Architectural Sheet Metal Manual (6th Edition)

1.4 INFORMATION SUBMITTALS

A. Warranty: Draft of installer two(2) year, no dollar limit (NDL) .

1.5 ACTION SUBMITTALS

- A. Product Data: Provide manufacturer's product data sheets for each type of product.
- B. Shop Drawings: Provide specific details and approved shop drawings including all flashing details for each location.
- C.
- D. Submittal documents shall be submitted to the proposed roofing membrane or system supplier/manufacturer for their review and approval.
- E. Submittals will not be considered approved until written approval of the patching methodology/system is received from roofing system or membrane manufacturer.

1.6 PRE-INSTALLATION CONFERENCE

- A. Conduit pre-installation meeting at the project site minimum 30 days before beginning work of this section.
 - 1. Required participants
 - a. Contracting Officer's Representative
 - b. Contractor
 - c. Installer
 - d. Other installers responsible for adjacent and intersecting work, including utility penetrations, rooftop curbs and HCAC equipment.
 - 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. Documents and distribute meeting minutes to participants
Ro record decisions affecting installation

1.7 PERFORMANCE REQUIREMENTS

- A. Provide an installed roofing membrane and base flashing system patching system that does not permit the passage of water.
- B. Roofing contractor shall provide all roofing and sealant materials that are physically and chemically compatible with each existing roof system.

1.8 REGULATORY REQUIREMENTS

- A. All work shall be performed in a safe, professional manner, conforming to all federal codes.
- B. Exterior Fire Test Exposure: Provide roofing system achieving a UL 790 Class ***CHOOSE ONE*** rating equal to the existing roof system.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver all roofing materials to the site in original containers, with factory seals intact. All products are to carry manufacturer's original labels.
- B. Store membrane on manufacturer-provided pallets in original, undisturbed wrappings.
- C. Store all pail goods in their original undamaged containers in a clean, dry location within their specified temperature range. Reference data sheets for product storage requirements.
- D. Do not expose materials to moisture in any form before, during or after delivery to the site. Reject delivery of materials that show evidence of contact with moisture.
- E. Use "breathable" type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Cover

and protect materials at the end of each work day. Do not remove any protective tarpaulins until immediately before the material will be installed.

1.10 WARRANTY

A. Installer's Guarantee: Submit roofing installer's guarantee signed by Installer, cover work of this Section, including all components of the roofing system for each location of the following guarantee period:

1. Guarantee Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLATES, FASTENERS AND ANCHORING BARS AT PATCH PERIMETER

A. As required by roofing patching system design and specified warranty requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that the existing surfaces and that the proposed system has been fully coordinated with the anchoring requirements of each piece of mechanical equipment.

3.2 ADHESIVES AND SEALANTS

A. Liquid adhesives and sealants shall be stored at a minimum temperature of 60° F. Verify adhesives are at 60° F or higher before use. Do not store adhesives with open lids due to loss of solvents which will occur from flash off.

3.3 TRAFFIC PROTECTION

- A. Install temporary and permanent walkway pads/rolls at all contractor roof access locations and other designated locations including perimeter work area for all roof-mounted equipment work locations and areas of repeated rooftop traffic as indicated on the drawings.
- B. Walkway pads shall allow for drainage either under or between the pads.
- C. Attach walkway pads to the roof membrane per roofing manufacturer's instructions.
- D. Walkway pads shall be part of the 2-year NDL Warranty.

3.4 ROOF PROTECTION

- A. Protect all partially and fully completed roofing work from other trades until completion.
- B. Stage materials in such a manner that foot traffic is minimized over completed roof areas.
- C. When it is not possible to stage materials away from locations where partial or complete installation has taken place, temporary walkways and platforms shall be installed in order to protect all completed roof areas from traffic and point loading during the application process.
- D. Temporary tie-ins shall be installed at the end of each workday and removed prior to commencement of work the following day.

3.5 CLEAN-UP

- A. All work areas are to be kept clean, clear and free of debris at all times.

- B. Do not allow trash, waste, or debris to collect on the roof.
These items shall be removed from the roof on a daily basis.
- C. All unused materials must be collected at the end of each
workday and protected from exposure to the elements.
- D. Properly clean the finished roof surface after completion per
the roofing membrane manufacturer's instructions.
- E. Clean and restore all damaged surfaces to their original
condition.
- F. Contractor shall "snake" adjacent roof drains to verify no
construction debris is lodged in the drainage piping.
Contractor shall coordinate this activity with GC Project
Manager's and VA COR observations.

- - - **END** - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 07 51 13.13
COLD-APPLIED BUILT-UP ASPHALT ROOFING PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-applied asphalt built-up roofing for waterproofing of new rooftop mechanical equipment supports and pads on existing areas with existing asphalt built-up roof systems.

1.2 RELATED WORK

A. Section 07 60 00, FLASHING AND SHEET METAL.

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):
- FX-1 (2016)Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
- C. National Roofing Contractors Association (NRCA):
- Manual -2019The NRCA Roofing Manual: Membrane Roof Systems.
- D. U.S. Department of Agriculture (USDA):
- BioPreferred® Program Catalog.

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.
1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Architect/Engineer.
 - c. General Contractor.
 - d. Roofing Installer.
 2. Mechanical Equipment Supplier
- 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 existing roof systems.
- h. Other items affecting successful completion.
- i. 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 fastener pattern and spacing.
 - 3. Roofing membrane seaming and joint details.
 - 4. Roof membrane penetration details.
 - 5. Base flashing and termination details.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Minimum fastener pullout resistance.
 - 3. Installation instructions.
 - 4. Warranty.
- 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. Sustainable Construction Submittals:
 - 1. Biobased Content:
 - a. Show type and quantity for each product.
 - 2. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
- 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 instructions.

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.

1.7 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, 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 roofing products manufacturer's storage and handling requirements.
- B. Store adhesives according to manufacturer's instructions.
- C. Protect products from damage during handling and construction operations.
- D. Products temporarily stored on the existing roof system and deck must not cause permanent deck deflection.

1.9 FIELD CONDITIONS

A. Environment:

Solvent based adhesives can be used at lower temperatures.

1. Product Temperature: Minimum 4 degrees C (40 degrees F) for minimum 48 hours 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: 10 years.

PART 2 - PRODUCTS

2.1

- A. Built-up asphalt roof patching material Basis of Design
 - 1. Markley Roofing 420 Omniseal ply base sheet
 - 2. Markley Roofing 430 Omniseal cap sheet
 - 3. EPDM pipe boots
 - 4. Or approved equal
- B. Installation instruction
 - 1. Markley Roofing products written installation
 - 2. Instructions for self-adhering Omniply products

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine and verify substrate for product installation with roofing Installer and roofing inspector present.
 - 1. Verify roof penetrations are complete, secured against movement, and fire stopped.
 - 2. Verify affected roof area is clean, dry, and in-plane ready to receive roofing system.
- B. Correct unsatisfactory conditions before beginning roofing work.

3.2 PREPARATION

- A. Broom clean and dry affected roof area. Remove dust, dirt and debris.

3.3 TEMPORARY PROTECTION

- A. Install temporary protection consisting of a temporary seal and water cut-offs at the end of each day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent.
- 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.

3.5 CLEANING

A. Remove excess adhesive before adhesive sets.

3.6 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 protective materials immediately before acceptance.

D. Repair damage.

PART 4 PRODUCT DATA SHEETS

HOT SPRINGS VA MEDICAL CENTER
HOT SPRINGS, SD

100% FINAL SOLUTION
02/23/2022

- - - E N D - - -

SECTION 075323
ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Adhered ethylene-propylene-diene-terpolymer (EPDM) roofing system.
2. Mechanically fastened, ethylene-propylene-diene-terpolymer (EPDM) roofing system.
3. Substrate board.
4. Vapor retarder.
5. Roof insulation.
6. Cover board over insulation.
7. Walkways.

- B. Section includes installation of sound-absorbing insulation strips in ribs of roof deck. Sound-absorbing insulation strips are furnished under Section 053100 "Steel Decking."

C. Related Requirements:

1. Section 072100 "Thermal Insulation" for insulation beneath the roof deck.
2. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
3. Section 077100 "Roof Specialties" for manufactured copings and roof edge flashings.
4. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Conduct conference at Project site

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
 1. Layout and thickness if insulation.
 2. Base flashings and membrane terminations.
 3. Flashing details at penetrations.
 4. Tapered insulation, thickness, and slopes.
 5. Roof plan showing orientation of steel roof deck and orientation of roof membrane and fastening spacings and patterns for mechanically fastened roofing system.
 6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 7. Tie-in with air barrier.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of complying with performance requirements.
 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- C. Product Test Reports: For components of roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- D. Compatibility Test Reports: For components of EPDM roof membrane system and Section 072726 Fluid--Applied Membrane Air Barrier, verify that materials and products required to join the roof membrane and the air and water-resistive membrane are compatible.
- E. Evaluation Reports: For components of roofing system, from ICC-ES.
1. Field Test Reports:
 2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.
- F. Sample Warranties: For manufacturer's special warranties.
- 1.7 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For roofing system to include in maintenance manuals.
- 1.8 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed or listed in FM Approvals' RoofNav for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
- 1.9 DELIVERY, STORAGE, AND HANDLING
- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, and other components of roofing system.
 2. Warranty Period: 20 years from Date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway products, for the following warranty period:
 1. Warranty Period: Two years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and flashings shall remain watertight.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and

application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
 - 1. Zone 1 (Roof Area Field): See Structural Drawings .
 - 2. Zone 2 (Roof Area Perimeter): See Structural Drawings .
 - 3. Zone 3 (Roof Area Corners): See Structural Drawings .
- D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
 - 1. Fire/Windstorm Classification: Class 1A-90 .
 - 2. Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 SH .

2.2 ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

- A. Reference drawings to determine decking types (metal and wood) and installation conditions (adhesive and mechanically attached).
- B. EPDM Sheet: ASTM D4637/D4637M, Type II, scrim or fabric internally reinforced, EPDM sheet with factory-applied seam tape.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or VA approved equal:
 - a. Carlisle SynTec Incorporated.
 - b. Firestone Building Products.
 - c. GenFlex Roofing Systems.
 - d. Johns Manville; a Berkshire Hathaway company.
 - e. Mule-Hide Products Co., Inc.
 - f. Versico Roofing Systems.
 - 2. Thickness: 60 mils, nominal.
 - 3. Exposed Face Color: Black .
 - 4. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.

2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 - 1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: 60-mil- thick EPDM, partially cured or cured, according to application.

- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Roof Vents: As recommended by roof membrane manufacturer.
 - 1. Size: Not less than 4-inch diameter.
- E. Bonding Adhesive: Manufacturer's standard.
- F. Seaming Material: Manufacturer's standard .
- G. Lap Sealant: Manufacturer's standard, single-component sealant , colored to match membrane roofing.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.4 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M, fiber-reinforced gypsum board.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
 - 2. Thickness: 1/2 inch .
 - 3. Surface Finish: Factory primed .
- B. Substrate Board: ASTM C728, perlite board; seal coated.
 - 1. Thickness: 5/8 inch .
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate panel to roof deck.

2.5 VAPOR RETARDER: Reference drawings for decking and installation conditions.

- A. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil- total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.
 - 1. Basis-of-Design: Interwrap Titanium PSU-30 or approved equal.

2.6 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by EPDM roof membrane manufacturer , approved for use in FM Approvals' RoofNav-listed roof assemblies .
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2 , felt or glass-fiber mat facer on both major surfaces.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Atlas Molded Products; a Division of Atlas Roofing Corporation.
 - b. Atlas Roofing Corporation.
 - c. Carlisle SynTec Incorporated.
 - d. Firestone Building Products.
 - e. GAF.
 - f. Insulfoam; Carlisle Construction Materials Company.
 - g. Johns Manville; a Berkshire Hathaway company.
 - h. Rmax, Inc.
 - 2. Compressive Strength: 25 psi.
 - 3. Size: 48 by 96 inches.
 - 4. Thickness:
 - a. Base Layer: 3 inches. .
 - b. Upper Layer: 3 inches. .
- C. Tapered Insulation: Provide factory-tapered insulation boards.
 - 1. Material: Match roof insulation .
 - 2. Minimum Thickness: 1/4 inch.
 - 3. Slope:
 - a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
 - b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

2.7 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
 - 1. Full-spread, spray-applied, low-rise, two-component urethane adhesive.

- D. Cover Board over Insulation: ASTM C1177/C1177M, glass-mat, water-resistant gypsum substrate, or ASTM C1278/C1278M, fiber-reinforced gypsum board.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
2. Thickness: 1/2 inch .
3. Surface Finish: Factory primed .

2.8 ASPHALT MATERIALS

- A. Roofing Asphalt: ASTM D312/D312M, Type III or Type IV .
- B. Asphalt Primer: ASTM D41/D41M.

2.9 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
1. Size: Approximately 36 by 60 inches.
 2. Color: Contrasting with roof membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
 4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 5. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer when tested according to ASTM F2170.
 - a. Test Frequency: One test probe per each 1000 sq. ft. , or portion thereof, of roof deck, with not less than three test probes.

- b. Submit test reports within 24 hours of performing tests.
- 6. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
 - 1. Submit test result within 24 hours of performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.
- D. Install sound-absorbing insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 072726 "Fluid-Applied Membrane Air Barriers."

3.4 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
 - 1. At steel roof decks, install substrate board at right angle to flutes of deck.
 - a. Locate end joints over crests of steel roof deck.

2. Tightly butt substrate boards together.
3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
4. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29.
5. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.
6. Loosely lay substrate board over roof deck.

3.5 INSTALLATION OF VAPOR RETARDER

- A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.
 1. Seal laps by rolling.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.6 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal Decking: Reference drawings for decking and installation conditions.
 1. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows .
 - a. Locate end joints over crests of decking.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - g. Loosely lay base layer of insulation units over substrate.
 - h. Mechanically attach base layer of insulation and substrate board using mechanical fasteners specifically designed and

- sized for fastening specified board-type roof insulation to metal decks.
- 1) Fasten insulation according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification .
 - 2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.
- a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - f. Trim insulation so that water flow is unrestricted.
 - g. Fill gaps exceeding 1/4 inch with insulation.
 - h. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - 1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

D. Installation Over Decking:

1. Mechanically fasten slip sheet to roof deck using mechanical fasteners specifically designed and sized for fastening slip sheet to wood decks.
 - a. Fasten slip sheet according to requirements in SPRI's Directory of Roof Assemblies for specified Wind Uplift Load Capacity.
 - b. Fasten slip sheet to resist specified uplift pressure at corners, perimeter, and field of roof.
2. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows.
 - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.

- d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - g. Loosely lay base layer of insulation units over substrate.
 - h. Mechanically attach base layer of insulation and substrate board using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to wood decks.
 - 1) Fasten insulation according to requirements in SPRI's Directory of Roof Assemblies for specified Wind Uplift Load Capacity.
 - 2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
3. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.
- a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - f. Fill gaps exceeding 1/4 inch with insulation.
 - g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - h. Loosely lay each layer of insulation units over substrate.
 - i. Adhere each layer of insulation to substrate using adhesive according SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - 1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
 - 2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.7 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
 - 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - 2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
 - 3. Cut and fit cover board tight to nailers, projections, and penetrations.
 - 4. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - a. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place, or
 - b. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.8 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll membrane roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of Owner's testing and inspection agency and Owner's testing and inspection agency.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeters.
- G. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- H. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- I. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.
- J. Adhere protection sheet over roof membrane at locations indicated.

3.9 INSTALLATION OF MECHANICALLY FASTENED ROOF MEMBRANE

- A. Mechanically fasten roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roofing membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel and Owner's testing and inspection agency.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Mechanically fasten or adhere roof membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- G. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- H. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.
- I. In-Splice Attachment: Secure one edge of roof membrane using fastening plates or metal battens centered within splice, and mechanically fasten roof membrane to roof deck. Field splice seam.
- J. Through-Membrane Attachment: Secure roofing using fastening plates or metal battens, and mechanically fasten roof membrane to roof deck. Cover battens and fasteners with a continuous cover strip.
- K. Adhere protection sheet over roof membrane at locations indicated.

3.10 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.11 INSTALLATION OF WALKWAYS

- A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.
 - 1. Install flexible walkways at the following locations:
 - a. Perimeter of each rooftop unit.
 - b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
 - c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
 - d. Top and bottom of each roof access ladder.
 - e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
 - f. Locations indicated on Drawings.
 - g. As required by roof membrane manufacturer's warranty requirements.
 - 2. Provide 6-inch clearance between adjoining pads.
 - 3. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.
- B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.13 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.14 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: .
2. Address: .
3. Building Name/Type: .
4. Address: .
5. Area of Work: .
6. Acceptance Date: _____.
7. Warranty Period: 20 years .
8. Expiration Date: _____.

- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

- D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding 110 mph ;
 - c. Fire;
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 075323

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 076200
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Formed wall sheet metal fabrications - (MTL-1).

- B. Related Requirements:

- 1. Section 073119 "Fiber Cement Wall Panels" for fiber cement siding.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each of the following

- 1. Underlayment materials.
 - 2. Elastomeric sealant.

- B. Shop Drawings: For sheet metal flashing and trim.

- 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
 - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.

4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches .

- C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

1.5 QUALITY ASSURANCE

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.

- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces .

2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - a. Color: Dark bronze .

2.3 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal

flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - b. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.4 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
 - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 - 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances:
 - 1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F. Do not use graphite pencils to mark metal surfaces.

2.5 WALL SHEET METAL FABRICATIONS

- A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
 1. Aluminum: 0.032 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder welds sealant.
 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 5. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 6. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 7. Do not field cut sheet metal flashing and trim by torch.
 8. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws .
- D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- E. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.3 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.4 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.6 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 077100
ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Copings - COP-1.

B. Related Requirements:

- 1. Section 076200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
- 2. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Preinstallation Conference: Conduct conference at Project site .

- 1. Meet with Owner, Architect, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
- 2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
- 3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

- 1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.

2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

C. Samples for Initial Selection: For factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Certificates: For each type of roof specialty.
- C. Sample Warranty: For manufacturer's special warranty.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class and SPRI ES-1 tested to specified design pressure.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
- B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.
- B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.8 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. SPRI Wind Design Standard: Manufacture and install copings and roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:
 1. Design Pressure: As indicated on Drawings .
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F , ambient; 180 deg F , material surfaces.

2.2 COPINGS - (COP-1)

- A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet , concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps. Width of copings varies according to width of parapet wall.
 1. Metallic-Coated Steel Sheet Coping Caps: Zinc-coated (galvanized) steel, nominal 0.028-inch thickness or thickness as required to meet performance requirements .
 - a. Surface: Smooth, flat finish.
 - b. Finish: Three-coat fluoropolymer .
 - c. Color: As selected by Architect from manufacturer's full range .

2. Corners: Factory mitered and soldered .
3. Coping-Cap Attachment Method: Snap-on , fabricated from coping-cap material.
 - a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.
 - b. Coping Spring: Concealed, stainless steel, attached to pre-punched anchor clips.

2.3 ROOF-EDGE SPECIALTIES - EDGE-1

- A. Metal roof-edge specialties as detailed in section lengths not exceeding 12 feet and a continuous formed galvanized-steel sheet cant, 0.028 inch thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units. Concealed fasteners only.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ATAS International, Inc.
 - b. Berridge Manufacturing Company.
 - c. Metal-Era, Inc.
 - d. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
 2. Metallic-Coated Steel Sheet Fascia Covers: Zinc-coated (galvanized) steel, nominal 0.034-inch thickness thickness as required to meet performance requirements .
 - a. Surface: Smooth, flat finish.
 - b. Finish: Three-coat fluoropolymer Three-coat metallic fluoropolymer .
 - c. Color: As selected by Architect from manufacturer's full range . Color to match roof panels
 3. Corners: Factory mitered and continuously welded or mechanically clinched and sealed watertight.
 4. Splice Plates: Concealed , of same material, finish, and shape as fascia cover.
 5. Fascia Accessories: Fascia extenders with continuous hold-down cleats , wall cap, and soffit trim as required for waterproof closure and finished appearance.

2.4 MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation.
- B. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.

- B. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Coil-Coated Galvanized-Steel Sheet Finishes:
 1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A755/A755M and coating and resin manufacturers' written instructions.
 - a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 - 3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 - 4. Torch cutting of roof specialties is not permitted.
 - 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 - 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
 - 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance .
- E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.3 INSTALLATION OF COPINGS

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.
 - 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements .

3.4 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 07 81 00
APPLIED FIRE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Sprayed fire-resistive materials.

1.3 DEFINITIONS

- A. SFRM: Sprayed fire-resistive materials.

1.4 PREINSTALLATION MEETINGS

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Sprayed fire-resistive material.
 - 2. Substrate primers.
 - 3. Bonding agent.
 - 4. Metal lath.
 - 5. Reinforcing fabric.
 - 6. Reinforcing mesh.
 - 7. Sealer.
 - 8. Topcoat.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Certificates: For each type of sprayed fire-resistive material.

- C. Evaluation Reports: For sprayed fire-resistive material, from ICC-ES.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on fire protection.

- 1. Provide test specimens and assemblies representative of proposed materials and construction.

- B. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.

- 1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 2. Density: Test for density according to ASTM E605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with sprayed fire-resistive material.
 - 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 5. For materials failing tests, obtain sprayed fire-resistive material manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fire protection when ambient or substrate temperature is 44 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

- B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide fire protection, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Source Limitations: Obtain fire protection from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E119 or UL 263 ; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

- A. Sprayed Fire-Resistive Material : Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application .
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Isolatek International; Cafco 400 or comparable product by one of the following:
 - a. Carbolite Company; a subsidiary of RPM International.
 - b. GCP Applied Technologies Inc.
 - c. Southwest Fireproofing Products Co.
 - d. Isolatek International.
 - 2. Bond Strength: Minimum 150-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E736.
 - 3. Density: Not less than density specified in the approved fire-resistance design, according to ASTM E605.
 - 4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design

- or ASTM E605, whichever is thicker, but not less than 0.375 inch.
5. Combustion Characteristics: ASTM E136.
 6. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 10 or less.
 - b. Smoke-Developed Index: 10 or less.
 7. Compressive Strength: Minimum 50 lbf/sq.in. according to ASTM E761.
 8. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
 9. Deflection: No cracking, spalling, or delamination according to ASTM E759.
 10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E760.
 11. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours according to ASTM E859.
 12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21 .
 13. Finish: Spray-textured finish . Apply separate, colored topcoat after finishing.
 - a. Color: As indicated by manufacturer's designations As selected by Architect from manufacturer's full range .

2.3 AUXILIARY MATERIALS

- A. Provide auxiliary materials that are compatible with sprayed fire-resistive material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by sprayed fire-resistive material manufacturer and complying with one or both of the following requirements:
 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for sprayed fire-resistive material and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E736.

- C. Bonding Agent: Product approved by sprayed fire-resistive material manufacturer and complying with requirements in UL's "Fire

Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.

- D. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by sprayed fire-resistive material manufacturer.
- E. Sealer: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Isolatek International.
- F. Topcoat: Suitable for application over sprayed fire-resistive material; of type recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.
 - 1. Water-Based Permeable Topcoat: Factory-mixed formulation for brush, roller, or spray application over applied SFRM. Provide application at a rate of as recommended by manufacturer .
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Isolatek International.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.
 - 1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.

2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 3. Verify that substrates receiving fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.
- B. Verify that concrete work on steel deck is complete before beginning Work.
 - C. Verify that roof construction, installation of rooftop HVAC equipment, and other related work are complete before beginning Work.
 - D. Conduct tests according to sprayed fire-resistive material manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
 - E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fire protection materials during application.
- B. Clean substrates of substances that could impair bond of fire protection.
- C. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.
- D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fire protection. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

- A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers,

sealers, topcoats, finishing, and other materials and procedures affecting fire protection Work.

- B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.
 - 1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
 - 2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.
- D. Metal Decks:
 - 1. Do not apply fire protection to underside of metal deck substrates until concrete topping, if any, is completed.
 - 2. Do not apply fire protection to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fire protection.
- E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and sprayed fire-resistive material manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer.
- F. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.
- G. Extend fire protection in full thickness over entire area of each substrate to be protected.
- H. Install body of fire protection in a single course unless otherwise recommended in writing by sprayed fire-resistive material manufacturer.
- I. Where sealers are used, apply products that are tinted to differentiate them from fire protection over which they are applied.

- J. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.
- K. Cure fire protection according to sprayed fire-resistive material manufacturer's written instructions.
- L. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.
- M. Finishes: Where indicated, apply fire protection to produce the following finishes:
 - 1. Spray-Textured Finish: Finish left as spray applied with no further treatment.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Test and inspect as required by the IBC , Subsection 1705.13, "Sprayed Fire-Resistant Materials."
- B. Fire protection will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace fire protection that does not pass tests and inspections, and retest.
 - 2. Apply additional fire protection, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

3.5 CLEANING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.6 PROTECTION

- A. Protect fire protection, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

3.7 REPAIRS

- A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.
- B. Repair fire protection damaged by other work before concealing it with other construction.
- C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078100

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 07 84 00
FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Provide UL or equivalent approved firestopping system for the closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.
- B. Provide UL or equivalent approved firestopping system for the closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 RELATED WORK:

- A. 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. Installer qualifications.
- C. Inspector qualifications.
- D. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.
- E. List of FM, UL, or WH classification number of systems installed.
- F. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.
- G. Submit certificates from manufacturer attesting that firestopping materials comply with the specified requirements.

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 QUALITY ASSURANCE:

- A. FM, UL, or WH or other approved laboratory tested products will be acceptable.

- B. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, fire stopping product manufacture Accredited Firestop Specialty Contractor Program, or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program" requirements. Submit qualification data.
- C. Inspector Qualifications: Contractor to engage a qualified inspector to perform inspections and final reports. The inspector to meet the criteria contained in ASTM E699 for agencies involved in quality assurance and to have a minimum of two years' experience in construction field inspections of firestopping systems, products, and assemblies. The inspector to be completely independent of, and divested from, the Contractor, the installer, the manufacturer, and the supplier of material or item being inspected. Submit inspector qualifications.

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. ASTM International (ASTM):
 - 1. E84-20 Standard Test Method for Surface Burning Characteristics of Building Materials
 - 2. E699-16 Standard Specification for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components
 - 3. E814-13a-17 Standard Test Method for Fire Tests of Penetration Fire Stop Systems
 - 4. E2174-20a Standard Practice for On-Site Inspection of Installed Firestop Systems
 - 5. E2393-20 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
- C. FM Global (FM):
 - 1. Annual Issue Approval Guide Building Materials
 - a. 4991-13 Approval of Firestop Contractors
- D. Fire Stopping Products Manufacture:
 - 1. Manufacture's Accredited Firestop Specialty Contractor Program
- E. Underwriters Laboratories, Inc. (UL):

1. Annual Issue Building Materials Directory
2. Annual Issue Fire Resistance Directory
 - a. 723-10(2008) Standard for Test for Surface Burning Characteristics of Building Materials
 - b. 1479-04(R2014) Fire Tests of Through-Penetration Firestops
- F. Intertek Testing Services - Warnock Hersey (ITS-WH):
 1. Annual Issue Certification Listings
- G. Environmental Protection Agency (EPA):
 1. 40 CFR 59(2014) National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS:

- A. Provide either 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. Firestop systems to accommodate building movements without impairing their integrity.
- B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 101 mm (4 in.) nominal pipe or 0.01 sq. m (16 sq. in.) in overall cross sectional area.
- C. Firestop sealants used for firestopping or smoke sealing to have the following properties:
 1. Contain no flammable or toxic solvents.
 2. Release 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 installed in exposed areas, capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

5. VOC Content: Firestopping sealants and sealant primers to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
 - a. Sealants: 250 g/L.
 - b. Sealant Primers for Nonporous Substrates: 250 g/L.
 - c. Sealant Primers for Porous Substrates: 775 g/L.
- D. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials to have 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.
- E. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84 or UL 723. Material to be an approved firestopping material as listed in UL Fire Resistance Directory or by a nationally recognized testing laboratory.
- F. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
- G. Materials to be nontoxic and noncarcinogen at all stages of application or during fire conditions and to not contain hazardous chemicals. Provide firestop material that is free from Ethylene Glycol, PCB, MEK, and asbestos.
- H. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 2. For floor penetrations with annular spaces exceeding 101 mm (4 in.) or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means acceptable to the firestop manufacturer.
 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS:

- A. Provide silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.
- B. Provide mineral fiber filler and bond breaker behind sealant.
- C. Sealants to have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with ASTM 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.
- B. Examine substrates and conditions with installer present for compliance with requirements for opening configuration, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Remove dirt, grease, oil, laitance and form-release agents from concrete, 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 each 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.
- C. Prime substrates where required by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- D. Masking Tape: Apply masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 INSTALLATION:

- A. Do not begin firestopping 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.
- D. Properly seal all abandoned penetrations through rated walls and floors. In floors, use grout, the full thickness of the slab, to meet fire rating requirements.
- E. Install temporary fire stopping systems at each penetration between rated floors or wall assemblies at the end of each working shift until permanent fire stopping systems have been installed.

3.4 CLEAN-UP:

- A. As work at each fire stopping location is completed, remove materials, litter, and debris.
- B. Clean up spills of liquid type materials.
- C. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- D. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to provide firestopping complying with specified requirements.

3.5 INSPECTIONS AND ACCEPTANCE OF WORK:

- A. Do not conceal or enclose firestop assemblies until inspection is complete and approved by the Contracting Officer Representative (COR).
- B. Furnish service of approved inspector to inspect firestopping in accordance with ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results. Submit written reports indicating locations of and types of penetrations and

type of firestopping used at each location; type is to be
recorded by UL listed printed numbers.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK

- A. Section 21 13 13, WET-PIPE FIRE SPRINKLER SYSTEMS.
- B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- C. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.
- D. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- E. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.
- F. EXTERIOR AND INTERIOR GENERAL CONTRUCTION

1.3 QUALITY ASSURANCE:

- A. Installer Qualifications: An experienced installer with a minimum of three (3) years' experience and 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. Submit qualification.
- B. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer.

1.4 CERTIFICATION

- A. Contractor is to submit to the COR written certification that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vapor tight seals (as applicable), and that materials supplied meet specified performance requirements.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's certification and installation instructions for each product used.
- C. Cured samples of exposed sealants for each color.

D. Manufacturer's Literature and Data:

1. Primers
2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

E. Manufacturer 10 year warranty.

1.6 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:

1. 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:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 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 exceeding 32 degrees C (90 degrees F) or less than 5 degrees C (40 degrees F).

1.8 DEFINITIONS

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Backing 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.

1.9 WARRANTY:

- A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".
- B. Manufacturer Warranty: Manufacturer shall warranty their sealant for a minimum of 5 years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.10 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. ASTM International (ASTM):
 - 1. C509-06 Elastomeric Cellular Preformed Gasket and Sealing Material
 - 2. C612-14 Mineral Fiber Block and Board Thermal Insulation
 - 3. C717-14a Standard Terminology of Building Seals and Sealants
 - 4. C734-06(R2012) Test Method for Low-Temperature Flexibility of Latex Sealants after Artificial Weathering
 - 5. C794-10 Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - 6. C919-12. Use of Sealants in Acoustical Applications.
 - 7. C920-14a Elastomeric Joint Sealants.
 - 8. C1021-08(R2014) Laboratories Engaged in Testing of Building Sealants
 - 9. C1193-13 Standard Guide for Use of Joint Sealants.
 - 10. C1248-08(R2012) Test Method for Staining of Porous Substrate by Joint Sealants
 - 11. C1330-02(R2013) Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
 - 12. C1521-13 Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
 - 13. D217-10 Test Methods for Cone Penetration of Lubricating Grease
 - 14. D1056-14 Specification for Flexible Cellular Materials-Sponge or Expanded Rubber

- 15. E84-09 Surface Burning Characteristics of Building Materials
- C. Sealant, Waterproofing and Restoration Institute (SWRI).
 - 1. The Professionals' Guide
- D. Environmental Protection Agency (EPA):
 - 1. 40 CFR 59(2014) National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SEALANTS

- A. Exterior Sealants:
 - 1. Vertical surfaces, provide non-staining ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
 - 2. Horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T.
 - 3. Provide location(s) of exterior sealant as follows:
 - a. Joints formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Provide sealant at exterior surfaces of exterior wall penetrations.
 - b. Metal to metal.
 - c. Voids where items penetrate exterior walls.
- B. Interior Sealants:
 - 1. Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
 - 2. Provide location(s) of interior sealant as follows:
 - a. Typical narrow joint 6 mm, (1/4 inch) or less at walls and adjacent components.
 - b. Interior surfaces of exterior wall penetrations.

2.2 COLOR

- A. Color of sealants for locations to be light gray or aluminum, unless otherwise indicated in construction documents.

2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; 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 or synthetic rubber (ASTM C509), 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.

2.4 WEEPS

- A. Weep/Vent Products: Provide the following unless otherwise indicated or approved.
 - 1. Round Plastic Tubing: Medium-density polyethylene, 10 mm (3/8-inch) OD by thickness of stone or masonry veneer.

2.5 FILLER

- A. Mineral fiberboard: ASTM C612, Class 1.
- B. Thickness same as joint width.
- C. 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 POROUS SURFACES

- A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners to be 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 SWRI (The Professionals' Guide).
- 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 but are not limited to the following:
 - a. Concrete.
 - b. Remove laitance and form-release agents from concrete.
 - c. 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. Nonporous surfaces include but are not limited to the following:
 - 1) Metal.
 - 2) Glass.
- C. Do not cut or damage joint edges.
- D. Apply non-staining 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 or as indicated by pre-construction joint sealant substrate test.
 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. Avoid application to or spillage onto adjacent substrate surfaces.

3.3 BACKING INSTALLATION

- A. Install backing 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 backing rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.
- D. Install backing 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 backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

3.4 SEALANT DEPTHS AND GEOMETRY

- A. At widths up to 1/4 inch, sealant depth equal to width.
- B. At widths over 1/4 inch, sealant depth 1/2 of width up to 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. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 degrees and 100 degrees F).
 2. Do not install 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.

3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
 4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
 5. Avoid dropping or smearing compound on adjacent surfaces.
 6. Fill joints solidly with compound and finish compound smooth.
 7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified otherwise in construction documents. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.
 8. Finish paving or floor joints flush unless joint is otherwise detailed.
 9. Apply compounds with nozzle size to fit joint width.
 10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
 11. Replace sealant which is damaged during construction process.
- B. Weeps: Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, at all flashing, and as indicated on construction documents.
1. Use round plastic tubing to form weep holes.
 2. Space weep holes formed from plastic tubing not more than 406 mm (16 inches) o.c.
 3. Trim tubing material used in weep holes flush with exterior wall face after sealant has set.
- C. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.
- D. Interior Sealants: 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. Openings: Apply a 1/4 inch bead of sealant around all cutouts to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
2. 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. 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.
- 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. 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 manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.
- B. Leave adjacent surfaces in a clean and unstained condition.

- - E N D - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 08 11 10
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hollow metal doors in hollow metal frames at indicated interior and exterior locations.
2. Hollow metal door frames for wood doors at indicated interior locations.

1.2 RELATED REQUIREMENTS

- A. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- B. Card Readers and Biometric Devices: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEM.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standard Institute (ANSI):
 1. A250.8-2014 - Standard Steel Doors and Frames.
- C. ASTM International (ASTM):
 1. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip.
 2. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
 3. E90-09 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- D. Federal Specifications (Fed. Spec.):
 1. L-S-125B - Screening, Insect, Nonmetallic.
- E. Master Painters Institute (MPI):
 1. No. 18 - Primer, Zinc Rich, Organic.
- F. National Association of Architectural Metal Manufacturers (NAAMM):
 1. AMP 500-06 - Metal Finishes Manual.
- G. National Fire Protection Association (NFPA):
 1. 80-16 - Fire Doors and Other Opening Protectives.
- H. UL LLC (UL):
 1. 10C-09 - Positive Pressure Fire Tests of Door Assemblies.

2. 1784-15 - Air Leakage Tests of Door Assemblies and Other Opening
Protectives.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA,
AND SAMPLES.
- B. Submittal Drawings:
 1. Show size, configuration, and fabrication and installation details.
- C. Manufacturer's Literature and Data:
 1. Description of each product.
 2. Include schedule showing each door and frame requirements fire label
and smoke control label for openings.
 3. Installation instructions.
- D. Sustainable Construction Submittals:
 1. Recycled Content: Identify post-consumer and pre-consumer recycled
content percentage by weight.
- E. Test reports: Certify each product complies products comply with
specifications.
- F. Qualifications: Substantiate qualifications comply with specifications.
 1. Manufacturer with project experience list.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. Regularly manufactures specified products.
 2. Manufactured specified products with satisfactory service on five
similar installations for minimum five years.

1.6 DELIVERY

- A. Fasten temporary steel spreaders across the bottom of each door frame
before shipment.
- B. Deliver products in manufacturer's original sealed packaging.
- C. Mark packaging, legibly. Indicate manufacturer's name or brand, type,
production run number, and manufacture date.
- D. 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 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Design hollow metal doors and frames complying with specified performance:
1. Fire Doors and Frames: UL 10C; NFPA 80 labeled.
 - a. Fire Ratings: See drawings.
 2. Smoke Control Doors and Frames: UL 1784; NFPA 80 labeled, maximum 0.15424 cu. m/s/sq. m (3.0 cfm/sf) at 24.9 Pa (0.10 inches water gage) pressure differential.
 3. Thermal Resistance: 10 R-value minimum at exterior doors.

2.2 MATERIALS

- A. Sheet Steel: ASTM A1008/A1008M, cold-rolled.
B. Galvanized Sheet Steel: ASTM A653.

2.3 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
B. Provide hollow metal doors and frames from one manufacturer.
C. Sustainable Construction Requirements:
 1. Steel Recycled Content: 30 percent total recycled content, minimum.

2.4 HOLLOW METAL DOOR

- A. Hollow Metal Doors: ANSI A250.8; 44 mm (1-3/4 inches) thick. See drawings for sizes and designs.
 1. Interior Doors: Level 3 and Physical Performance Level A, extra-heavy duty; Model 2, seamless at stairs, storage, and security locations.
 2. Exterior Doors: Level 3 and Physical Performance Level A, extra-heavy duty; Model 2, seamless at all locations.
- B. Door Faces:
 1. Interior Doors: Galvanized sheet steel minimum Z120 or ZF120 (G40 or A40).
 2. Exterior Doors: Galvanized sheet steel minimum Z180 or ZF180 (G60 or A60).
- C. Door Cores:
 1. Interior Doors: Vertical steel stiffeners.

2. Exterior Doors: Polyurethane.
3. Fire Doors: Manufacturer's standard complying with specified fire rating performance.

2.5 HOLLOW METAL FRAMES

- A. Hollow Metal Frames: ANSI A250.8; Face welded. See drawings for sizes and designs.
 1. Interior Frames:
 - a. Level 2 and Level 3 Hollow Metal Doors: 1.3 mm (0.053 inch) thick.
 - b. Wood Doors: 1.0 mm (0.042 inch) 1.3 mm (0.053 inch)thick.
- B. Frame Materials:
 1. Interior Frames: Galvanized sheet steel minimum Z120 or ZF120 (G40 or A40)
 2. Exterior Frames: Galvanized sheet steel minimum Z180 or ZF180 (G60 or A60)

2.6 FABRICATION

- A. Hardware Preparation: ANSI A250.8; for hardware specified in Section 08 71 00, DOOR HARDWARE.
- B. Hollow Metal Door Fabrication:
 1. Close top edge of exterior doors flush and seal to prevent water intrusion.
 2. Fill spaces between vertical steel stiffeners with insulation.
- C. Fire and Smoke Control Doors:
 1. Close top and vertical edges flush.
 2. Apply steel astragal to active leaf at pair and double egress doors.
 - a. Exception: Where vertical rod exit devices are specified for both leaves swinging in same direction.
 3. Fire and Smoke Control Door Clearances: NFPA 80.
- D. Hollow Metal Frame Fabrication:
 1. Terminated Stops: ANSI A250.8.
 2. Two Piece Frames:
 - a. One piece unequal leg finished rough buck sub-frames as shown, drilled for anchor bolts.
 - b. Unequal leg finished frames formed to fit subframes and secured to subframe legs with countersunk, flat head screws, spaced 300 mm (12 inches) on center at head and jambs on both sides.
 - c. Preassemble at factory for alignment.

3. Frame Anchors:

a. Floor anchors:

- 1) Provide extension type floor anchors to compensate for depth of floor fills.
- 2) Provide 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive floor fasteners.
- 3) Provide mullion 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two floor fasteners and frame anchor screws.
- 4) Provide continuous 1 mm (0.042 inch) thick steel rough bucks drilled for floor fasteners and frame anchor screws for sill sections.

a) Space floor bolts 50 mm (2 inches) on center.

b. Jamb anchors:

- 1) Place anchors on jambs:
 - a) Near top and bottom of each frame.
 - b) At intermediate points at maximum 600 mm (24 inches) spacing.
- 2) Form jamb anchors from steel minimum 1 mm (0.042 inch) thick.
- 3) Anchors for stud partitions: Provide tabs for securing anchor to sides of studs. Provide one of the following:
 - a) Welded type.
 - b) Lock-in snap-in type.
- 4) Anchors for frames set in prepared openings:
 - a) Steel pipe spacers 6 mm (1/4 inch) inside diameter, welded to plate reinforcing at jamb stops, or hat shaped formed strap spacers 50 mm (2 inches) wide, welded to jamb near stop.
 - b) Drill jamb stop and strap spacers for 6 mm (1/4 inch) flat head bolts to pass through frame and spacers.
 - c) Two piece frames: Subframe or rough buck drilled for 6 mm (1/4 inch) bolts.
- 5) Anchors for observation windows and other continuous frames set in stud partitions.
 - a) Weld clip anchors to sills and heads of continuous frames over 1200 mm (4 feet) long.
 - b) Space maximum 600 mm (24 inches) on centers.

- 6) Modify frame anchors to fit special frame and wall construction.
- 7) Provide special anchors where shown on drawings and where required to suit application.

2.7 FINISHES

- A. Galvanized Steel: ANSI A250.8; shop primed.

2.8 ACCESSORIES

- A. Primers: ANSI A250.8.
- B. Barrier Coating: ASTM D1187/D1187M.
- C. Welding Materials: AWS D1.1/D1.1M, type to suit application.
- D. Clips Connecting Members and Sleeves: Match door faces.
- E. Fasteners: Galvanized steel.
 1. Metal Framing: Steel drill screws.
- F. Anchors: Galvanized steel.
- G. Galvanizing Repair Paint: MPI No. 18.
- H. Insulation: Unfaced mineral wool.

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. Apply barrier coating to metal surfaces in contact with cementitious materials to minimum 0.7 mm (30 mils) dry film thickness.

3.2 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.
 2. Install fire doors and frames according to NFPA 80.
 3. Install smoke control doors and frames according to NFPA 105.

3.3 FRAME INSTALLATION

- A. Plumb, align, and brace frames until permanent anchors are set.
 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 when shipping spreader is removed.
 3. Where construction permits concealment, leave shipping spreaders in place after installation, otherwise remove spreaders when frames are set and anchored.
 4. Remove wood spreaders and braces when walls are built and jamb anchors are secured.
- B. Floor Anchors:
1. Anchor frame jambs to floor with two expansion bolts.
 - a. Lead Lined Frames: Use 9 mm (3/8 inch) diameter bolts.
 2. Power actuated drive pins are acceptable to secure frame anchors to concrete floors.
- C. Jamb Anchors:
1. Metal Framed Walls: Secure anchors to sides of studs with two fasteners through anchor tabs.
- D. Touch up damaged factory finishes.
1. Repair galvanized surfaces with galvanized repair paint.

3.4 DOOR INSTALLATION

- A. Install doors plumb and level.
- B. Adjust doors for smooth operation.
- C. Touch up damaged factory finishes.
1. Repair galvanized surfaces with galvanized repair paint.
 2. Repair painted surfaces with touch up primer.

3.5 CLEANING

- A. Clean exposed door and frame surfaces. Remove contaminants and stains.

3.6 PROTECTION

- A. Protect doors and frames from traffic and construction operations.
- B. Remove protective materials immediately before acceptance.
- C. Repair damage.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 08 14 16

FLUSH WOOD VENEER DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior Flush Hardwood Veneer Doors:
 - 1. Five-ply flush bonded fire rated doors.

1.2 RELATED SECTIONS

- A. Section 08 11 10 - Hollow Metal Doors and Frames.
- B. Section 08 71 00 - Door Hardware.

1.3 REFERENCES

- A. ANSI A208.1 - Particleboard.
- B. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- C. ASTM E 413 - Classification for Rating Sound Insulation.
- D. AWI/AWMAC/WI Architectural Woodwork Standards, Edition 1, Section 9 - Doors.
- E. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
- F. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
- G. WDMA Finish System TR-6, Catalyzed Polyurethane.
- H. WDMA I.S. 1A-11 - Architectural Wood Flush Doors.

1.4 SUBMITTALS

- A. Comply with Section 01330 (01 33 23) - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including door construction description and WDMA I.S.1-A and AWS classifications.
- C. Schedules: Submit manufacturer's schedules, including door dimensions, cutouts, species, finish, and hardware. Reference individual door numbers as indicated on the Drawings.

- D. Samples: Submit manufacturer's door finish samples, showing range of color variation.
- E. Test Reports: Submit manufacturer's test results of STC ratings from testing performed by independent testing agency for sound-retardant doors.
- F. Manufacturer's Certification: Submit manufacturer's certification that doors comply with specified requirements and are suitable for intended application.
- G. Environmental Documentation: Submit manufacturer's environmental documentation for the following LEED V3 credits.
 - 1. MR Credit 4: Recycled Content.
 - 2. MR Credit 6: Rapidly Renewable Materials.
 - 3. MR Credit 7: Certified Wood.
 - 4. EQ Credit 4.4: Low-Emitting Materials - Composite Wood and Agrifiber Products.
- H. Environmental Documentation: Submit manufacturer's environmental documentation.
 - 1. MR Building Life-Cycle Impact-Reduction
 - 2. MR Building Product Disclosure and Optimization- Environmental Product Declarations - Option 1
 - 3. MR Building Product Disclosure and Optimization - Material Ingredients - Option 1
 - 4. MR Building Product Disclosure and Optimization - Sourcing of Raw Materials - Option 2
 - 5. MR Low Emitting Materials - Composite Wood Category
 - 6. EQ Low-Emitting Materials - Composite Wood and Agrifiber Products
- I. Cleaning Instructions: Submit manufacturer's cleaning instructions for doors.
- J. Warranty: Submit manufacturer's standard warranty.

1.5 QUALITY ASSURANCE

- A. Tolerances for Warp, Telegraphing, Squareness, and Prefitting Dimensions: WDMA I.S.1-A.
- B. Identifying Label: Each door shall bear identifying label indicating:
 - 1. Door manufacturer.
 - 2. Order number.
 - 3. Door number.
 - 4. Fire rating, if applicable.
- C. Fire-Rated Doors: Labeled by Intertek/Warnock Hersey.

1. Construction Details and Hardware Application: Approved by labeling agency.

D. Environmental Responsibility: Provide doors manufactured with the following environmentally responsible components:

1. Core:
 - a. Agrifiber Core:
 - 1) Rapidly renewable materials.
 - 2) Pre-consumer recycled content.
 - 3) No added formaldehyde.
 - b. Particleboard Core:
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) Pre-consumer recycled material.
 - 3) No added urea formaldehyde.
 - 4) CARB NAF / ULEF
 - c. Stave Lumber Core:
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) No added formaldehyde.
 - d. Structural Composite Lumber (SCL) Core:
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) No added formaldehyde.
2. Composite Crossband:
 - a. High-Density Fiberboard (HDF):
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) Pre-consumer recycled material.
 - 3) CARB NAF / ULEF
3. Stiles and Rails:
 - a. Structural Composite Lumber (SCL):
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) No added formaldehyde.
4. GREENGUARD Certification Program.
 - a. GREENGUARD Indoor Air Quality Certified.
5. SCS Indoor Air Quality Program
 - a. Indoor Advantage Gold Certified

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 1. Deliver doors to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
 2. Package doors individually in polybags.
- B. Storage:
 1. Store doors in accordance with manufacturer's instructions.
 2. Store doors in clean, dry area indoors, protected from damage and direct sunlight.
 3. Store doors flat on level surface.
 4. Do not store doors directly on concrete.

5. Keep doors completely covered. Use covering which allows air circulation and does not permit light to penetrate.
6. Store doors between 50 and 90 degrees F (10 and 32 degrees C) and 30 to 50 percent relative humidity.

C. Handling:

1. Handle doors in accordance with manufacturer's instructions.
2. Protect doors and finish during handling and installation to prevent damage.
3. Handle doors with clean hands or clean gloves.
4. Lift and carry doors. Do not drag doors across other doors or surfaces.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not subject doors to extreme conditions or changes in temperature or relative humidity in accordance with WDMA I.S.1-A.

1.8 WARRANTY

- A. Warrant solid core, interior doors for life of installation against warpage, delamination, and defects in materials and workmanship.
- B. Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing, and rehanging as required.

PART 2 PRODUCTS

2.1 MANUFACTURER- BASIS OF DESIGN

- A. VT Industries, Inc., 1000 Industrial Park, PO Box 490, Holstein, Iowa 51025. Toll Free (800) 827-1615. Phone (712) 368-4381. Fax (712) 368-4111. www.vtindustries.com. door_info@vtindustries.com.
- B. Or approved equal.

2.2 FIRE RATED DOORS - BASIS OF DESIGN

- A. VT Industries style 110
- B. Or approved equal.
- C. Face veneer to match existing wood veneer doors.

2.3 FABRICATION

- A. Prefit Doors:
1. Prefit and bevel doors at factory to fit openings.
 2. Prefit Tolerances: WDMA I.S.1-A and AWS Section 9.

- B. Factory-machine doors for mortised hardware, including pilot holes for hinge screws and lock fronts required.

2.4 FINISHES

- A. Doors shall receive factory finishing.
- B. Factory Finishing: .WDMA System TR-8, UV cured urethane, premium grade.
 - 1. Stain coat.
 - 2. Sealer: minimum 3 coats.
 - 3. Sanding: Sand.
 - 4. Topcoat: 2 coats.
- C. Top and Bottom Rails: Factory sealed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine locations to receive doors. Notify COR of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.
- B. Ensure frames are solidly anchored, allowing no deflection when doors are installed.
- C. Ensure frames are plumb, level, square, and within tolerance.

3.2 PREPARATION

- A. Allow doors to become acclimated to building temperature and relative humidity for a minimum of 24 hours before installation.

3.3 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions.
- B. Install doors at locations indicated on the Drawings.
- C. Install doors plumb, level, and square.
- D. Install door hardware as specified in Section 08 71 00.

3.4 ADJUSTING

- A. Adjust doors to swing freely, without binding in frame.
- B. Adjust hardware to operate properly.

- C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- D. Remove and replace damaged doors that cannot be successfully repaired, as determined by COR.

3.5 CLEANING

- A. Clean doors promptly after installation in accordance with manufacturer's instructions.
- B. Do not use harsh cleaning materials or methods that could damage finish.

3.6 PROTECTION

- A. Protect installed doors from damage during construction.

END OF SECTION

SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and panels installed in gyp bd walls and gyp bd ceilings.

1.2 RELATED REQUIREMENTS

- A. Field Painting: Section 09 91 00, PAINTING.
- B. Finish Color: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Welding Society (AWS):
 1. D1.3/D1.3M-08 - Structural Welding Code - Sheet Steel.
- C. ASTM International (ASTM):
 1. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Sip Process.
 2. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable.
 3. A666-15 - Annealed or Cold-Worked Austenitic Stainless Steel sheet, Strip, Plate, and Flat Bar.
 4. E119-15 - Fire Test of Building Construction and Materials.
- D. National Fire Protection Association (NFPA):
 1. 80-16 - Fire Doors and Other Opening Protectives.
 2. 251-12 - Fire Tests of Door Assemblies.
- E. National Association of Architectural Metal Manufacturers (NAAMM):
 1. AMP 500-06 - Metal Finishes Manual.
- F. UL LLC (UL):
 1. Listed - Online Certifications Directory.
 2. 10B-08 - Standard for Fire Tests of Door Assemblies.
 3. 263-11 - Fire Tests of Building Construction and Materials.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Installation instructions.
- D. Sustainable Construction Submittals:
 - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

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 FIELD CONDITIONS

- A. Field Measurements: Verify field conditions affecting access door fabrication and installation. Show field measurements on Submittal Drawings.
 - 1. Coordinate field measurement and fabrication schedule to avoid delay.

1.8 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel Sheet: ASTM A1008/A1008M.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide each product from one manufacturer.
- C. Sustainable Construction Requirements:

1. Steel Access Doors Recycled Content: 30 percent total recycled content, minimum.

2.3 ACCESS DOORS, FIRE-RATED

- A. Door Construction:
 1. Ceiling Access Door Construction: ASTM E119 or UL 263.
 2. Wall Access Doors: NFPA 252 or UL 10B.
- B. Label: Class B opening according to UL 10B or test by another nationally recognized laboratory. 1 hour or 2 hour fire-rated with maximum temperature rise of 120 degrees C indicated on drawings.
- C. Door Panel: Minimum 0.9 mm (0.0359 inch) thick steel stainless steel sheet, with mineral-fiber insulation core, insulated sandwich type construction.
- D. Frame: Minimum 1.5 mm (0.0598 inch) thick steel sheet, depth and configuration to suit material and construction type where installed.
 1. Frame Flange: Provide at units installed in concrete, masonry, or gypsum board.
 2. Exposed Joints in Flange: Weld and grind smooth.
- E. Provide automatic closing device.
- F. Hinge: Continuous steel.
- G. Lock: Flush, screw driver-operated cam lock.
- H. Anchors for Fire-Rated Access Doors: Comply with requirements of applicable fire test.

2.4 ACCESS DOORS, FLUSH PANEL, NON-RATED

- A. Door Panel:
 1. 1.9 mm (0.07 inch) thick steel sheet.
 2. Reinforce to maintain flat surface.
- B. Frame:
 1. 1.5 mm (0.06 inch) thick steel stainless steel sheet, depth and configuration to suit material and construction type where installed.
 2. Frame Flange: Provide at units installed in concrete, masonry, and gypsum board.
 3. Exposed Joints in Flange: Weld and grind smooth.
- C. Hinge:
 1. Concealed spring hinge, 175 degrees of opening.
 2. Removable hinge pin to allow removal of door panel from frame.

- D. Lock:
 - 1. Flush, screwdriver-operated cam lock.

2.5 FABRICATION - GENERAL

- A. Size: Minimum 600 mm (24 inches) square door unless otherwise shown on drawings.
- B. Component Fabrication: Straight, square, flat and in same plane where required.
 - 1. Exposed Edges: Slightly rounded, without burrs, snags and sharp edges.
 - 2. Exposed Welds: Continuous, ground smooth.
 - 3. Welding: AWS D1.3/D1.3M.
- C. Locks and Non-Continuous Hinges: Provide in numbers required to maintain alignment of door panel with frame. For fire-rated doors, provide hinges and cam locks as required by fire test.
- D. Anchoring: Make provisions in frame for anchoring to adjacent construction. Provide anchors in size, number and location on four sides to secure access door to substrate. Provide anchors as required by fire test.

2.6 FINISHES

- A. Steel Paint Finish:

2.7 ACCESSORIES

- A. Fasteners: Type and size recommended by access door manufacturer, to suit application.
 - 1. Other Access Doors: Galvanized steel.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 - 1. Verify access door locations and sizes provide required maintenance access to installed building services components.
- B. Protect existing construction and completed work from damage.

3.2 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 COR.
- B. Install access doors and panels permitting access to service valves, traps, dampers, cleanouts, and other mechanical, electrical and conveyor control items concealed in walls and partitions, and concealed above gypsum board and plaster ceilings.
- C. Install fire rated access door according to NFPA 80.
- D. Install fire-rated doors in fire-rated partitions and ceilings.
- E. Install flush access panels in partitions and in gypsum board and plaster ceilings.

3.3 ACCESS DOOR AND FRAME INSTALLATION

- A. Wall Installations: Install access doors in openings with sides vertical.
- B. Ceiling Installations: Install access doors parallel to ceiling suspension grid or room partitions.
- C. Frames without Flanges: Install frame flush with surrounding finish surfaces.
- D. Frames with Flanges: Overlap opening, with face uniformly spaced from finish surface.
- E. Recessed Panel Access Doors: Install with face of surrounding materials flush with door panel installed finish.
- F. Secure frames to adjacent construction with fasteners.
- G. Install type, size and quantity of anchoring device suitable for material surrounding opening to maintain alignment, and resist displacement, during normal use of access door.
- H. Field Painting Primed Access Doors: Comply with the requirements of Section 09 91 00, PAINTING.

3.4 ADJUSTMENT

- A. Adjust hardware so door panel opens freely.
- B. Adjust door when closed so door panel is centered in frame.

- - E N D - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 083400.10
aisle containment curtain

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification shall define the mechanical characteristics and requirements for the Aisle Containment - Vertical System.
- B. The Vertical System is a vertical vinyl partition that hangs from a drop ceiling or Uni-strut and is available in kits that include high-grade aluminum track, UL and FM rated fire suppression links and 0.40 mil thick ESD fire resistant vinyl.

1.2 STANDARDS

- A. The product shall be designed in accordance with the following agency standards or certifications. Where a conflict arises between these documents and statements made herein, the statements in this specification shall govern.
 - 1. UL 94-V-0 compliant
 - 2. 1,000 Hours U.V. - ASTM Weatherometer
 - 3. CPAI-84 (Standard for fire retardancy of pliable materials) compliant
 - 4. NFPA-701 (Standard for flame / fire retardancy tests for films) compliant
 - 5. Standard for testing fade resistance to UV light
 - 6. Fusible link; UL# JGIX.R1431

PART 2 - PRODUCT

2.1 TYPES

- A. The door, ceiling or combined system shall use a vertical vinyl strip design to accommodate non-uniform rack heights and non-uniform rows. While it is the most flexible system to deploy, it does require a drop ceiling. The design is a simple one that incorporates current fire detection and suppression. It can also be used in conjunction with 90° corner brackets.
- B. VERTICAL ROOF

C. The vertical roof partition shall be 0.40 mil thick vinyl, available in 1-6 ft. (0.3-1.8m) linear width sections and drop-down lengths from 29" to 182" (736.6mm to 4622.8mm) sections. Vertical roof strips work with standard or any non-standard/uneven rows. This system is also designed to be used with the DCM racks, DCF racks or racks built by other manufacturers. The aluminum tracks shall be connected with a splicer to form a continuous track system.

1. Aluminum Track: Anodized aluminum with an ultimate tensile strength of at least 22,000 psi (1517 Bars).
2. The vinyl partition material will have a 2-inch extension to overlap with adjacent vinyl partition. This will ensure a seamless partition.

D. VERTICAL DOORS

E. The vertical strip door material shall be 0.40 mil thick vinyl, available in 1-6 ft. (0.3-1.8m) linear width sections and lengths from 98" to 182" (2489.6mm to 4622.8mm) sections. Vertical door strips work with standard 4 ft. (1.2m) and 6 ft. (1.8m) aisles and also with non-standard aisle dimensions.

1. The vinyl strip partition material will have a 2-inch (50.8mm) extension to overlap with adjacent vinyl drop-down material. This will ensure a seamless partition.

2.2 CORNER BRACKETS

A. The Vertical System shall offer the choice of selecting rounded corner pieces or using straight pieces to form a 90° corner. If using rounded corner pieces, subtract 2 ft. (0.6m) from the row length on each side of the aisle. Applying vertical strip doors with rounded corners requires using the same vinyl length with the corner pieces and the vinyl strip doors.

2.3 FUSIBLE LINKS

A. Listed by Underwriters Laboratories and FM Global. Mechanical heat activated. Maximum load = 45 lb. (20.4kg); Minimum load = 3 lb. (1.4kg). Corrosion resistant construction, brass components, high strength symmetrical shape, solid eye-to-eye connection for 360-degree placement.

1. Ceiling Attachment: Spring steel. Twist-on to lock securely onto the ceiling grid. 7/16 in. (11.1mm) diameter loop. 1-1/2 in. (38.1mm) long.

HOT SPRINGS VA MEDICAL CENTER
HOT SPRINGS, SD

100% FINAL SOLUTION
02/23/2022
11/30/2021

PART 3 - WARRANTY (U.S. SALES ONLY)

3.1 STANDARD WARRANTY

- A. The Vertical System shall be warranted against defects in materials and workmanship for two (2) years from the date of shipment. For the complete warranty terms and description, refer to the separate warranty statement at www.liebert.com.

END OF SECTION 083400.10

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 08 34 53
SECURITY DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The extent of exterior forced-entry resistant (FE) door assemblies required for B157 is indicated on Contract Drawings, and in Door/Frame/Hardware schedules, including construction, profiles, swing, sizes, hardware, accessories, devices, and locations.

1.2 RELATED WORK

- A. Division 3, CONCRETE.
B. Division 4, MASONRY.
C. Division 5, METALS for steel supports.
D. Section 08 11 10, HOLLOW METAL DOORS AND FRAMES: Doors and frames not designated for special security performances.
E. Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEMS: Card readers and biometric devices.:

1.3 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. ASTM International (ASTM):
A153/A153M-16a.....Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A653/A653M-20.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
A1008/A1008M-20.....Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
- C. American National Standards Institute (ANSI):
ANSI A156.115 (2014) ...Hardware Preparation in Steel Doors and Steel Frames

ANSI/SDI A250.8 (2014) .Specifications for Standard Steel Doors and
Frames

ANSI/SDI A250.11 (2012) Recommended Erection Instructions for Steel
Frames.

D. American Welding Society (AWS):

D1.1/D1.1M (2010)Structural Welding Code - Steel

E. Society for Protective Coatings (SSPC):

SSPC-SP 2 - 2004.....Hand Tool Cleaning

SSPC-SP 3 - 2004.....Power Tool Cleaning

1.4 PERFORMANCE REQUIREMENTS

A. General: Fabricate and install FE door assemblies to achieve indicated level of resistance. Extend resistance to include anchorages, interfaces with adjoining substrates, and hardware. Security attacks shall be unable to penetrate through closed/locked security door assemblies in manner described; it is recognized that such attacks may damage units beyond repair and reuse, requiring replacement of work by Government:

1. Forced-Entry (FE) resistant assemblies: Where door assembly is shown or scheduled as FE, provide door manufacturer's material and fabrication for panels, inserts, hardware, devices, and framing of units. Provide rated units where shown or scheduled:
2. Provide resistance of 15 minutes for forced entry, using basic hand tools.

1.5 SUBMITTALS

- A. General: For each security door assembly, submit the following in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
1. Product data for each element of work, whether purchased from other manufacturers or provided as door Fabricator's standard production. Include data substantiating that products comply with requirements of these specifications.
 2. Manufacturer's standard color chart.
 3. Certificates: Letter from manufacturer indicating the products have been certified to meet the specified ratings.
 4. Shop drawings showing each dimensioned details of each door assembly, including performance rating, swing, hardware set, and adjacent

construction. Provide drawings on B-size 11 in x 17 inch (300 mm x 430 mm) sheets. Show typical door exterior elevations at not less than $\frac{1}{4}$ inch = 1 foot (1:50) scale. After final modifications and corrections have been incorporated into the drawings, submit drawings as AutoCAD files with DWG extension. Show the following:

- a. Unit information:
 - 1) Model Number.
 - 2) Door/frame finish.
 - 3) Door type.
- b. Elevation Drawings:
 - 1) Rough opening.
 - 2) Door opening.
 - 3) Frame opening.
 - 4) Finished floor.
 - 5) Sill condition.
 - 6) Weather-stripping.
 - 7) Reference numbers for primer and finish paint, including number of coats applies.
 - 8) Door class rating: non-rated.
 - 9) Door and frame gauge thickness.
- c. Plan drawings:
 - 1) Relate to elevation on drawing.
 - 2) Identify "Attack" and "Protected" sides.
 - 3) Identify door swing (i.e., RH, LH, RHRB, LHRB).
 - 4) Provide key on drawings.
 - 5) Indicate room space numbers taken from Contract Drawings.
- d. Details: Show section at not less than $\frac{3}{4}$ inch = 1 ft (1:20) scale of members indicating construction, size, and thickness of components, frame profile, location of conduit entry, threshold configuration, vision panel together with connections, fastenings, and means of separating dissimilar metals.
- e. Installation instructions shall cite all anchorage components, including complete description of expansion anchor as well as installation criteria such as torque requirements, minimum embedment, and minimum edge distance, and shall include alert to

installers to avoid cutting of rebar during concrete anchor installation.

1.6 QUALITY ASSURANCE

- A. Testing Laboratory Qualifications: For compliance with non-security performance requirements (such as fire ratings, resistance to deterioration from moisture, accessibility to persons with disabilities) on security door assemblies of this Section, use only those testing laboratories which have successfully demonstrated to Project Manager that they have experience and capabilities needed to satisfactorily conduct required tests.

1.7 IDENTIFICATION SYSTEMS

- A. Identify each assembly to provide VA with ready reference to original manufacturer to facilitate reorders, replacement parts, service, resolution of complaints, and inventory. The label shall be typically embossed/printed metal plate or metallic foil with adhesive backing for permanent identification. Locate label so that it is readily visible and convenient for identification by Project Manager after installation of assembly. The label shall be approximately 1½ inch x 3 inch (40 x 75 mm) and shall cite:
 - 1. Manufacturer's name/city/state.
 - 2. Contract number.
 - 3. Month/Year of manufacture.
 - 4. Mark number and Ballistic resistant rating.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver each assembly project site with fabrication, finishing, and assembly of primary panels, inserts, and frames completed and prepared for installation and connection with security systems. Disassemble hardware for shipping only to extent hardware interferes with shipping.
- B. Refer to Division One for shipping requirements.
- C. Provide removable spreader bar between jambs during fabrication, delivery, and installation and to include mullions of each frame assembly, except where integral threshold is required and serves same purpose. Do not mar finishes of assembly with installation or removal of spreader bars.
- D. Provide protection of pre-finished units, such as pre-finished with baked enamel using self-adhesive paper.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Certified units: provide units, including frames and sub-frames which are produced by manufacturer who has previously produced, within last 10 years, units of similar security attack resistance of equivalent size and resistance ratings.

2.2 MATERIALS, GENERAL

- A. Hot-Rolled Steel Sheets and Strips: ASTM A1011, commercial quality, pickled and oiled, except as otherwise indicated.
- B. Cold-Rolled Steel Sheets: ASTM A1008, commercial quality, except as otherwise indicated.
- C. Galvanized Steel Sheets: ASTM A653 with G90 zinc coating, mill phosphatized; commercial quality, except as otherwise indicated.
- D. Supports and Anchors: Fabricate to endure required performances, but of not less than 1/16 inch (1.5 mm) sheet steel. For exterior wall assemblies, hot-dip zinc coat support/anchor units after fabrication in compliance with ASTM A 153, Class B.
- E. Inserts, Bolts, Fasteners: Standard units of strengths required to endure performances; hot-dip zinc coated where used in exterior wall assemblies in compliance with ASTM A 153, Class C/D.

2.3 HARDWARE

- A. General: Provide special units of door hardware to achieve performances, and as shown and scheduled. Standard units for each security door assembly are specified to be furnished as work of Section 08 71 00, DOOR HARDWARE; see Project "Finish Hardware Schedule" and "Data Sheets," and provisions of this Section, as well as notes on door-and-frame schedule.

2.4 FABRICATION AND ASSEMBLY

- A. General: Fabricate, test, and preassemble security door assemblies with hardware at factory; disassemble hardware only to extent necessary for handling, packaging, shipment, and installation at Project. Fabricate metal work to comply with performance requirements. Fabrications shall be rigid, neat, and free from warp/buckle/similar defects, with eased edges and continuously-welded joints, ground where exposed, to produce

smooth, flush, invisible joints. Weld in accordance with AWS D1.1, Structural Welding Code for Steel:

1. Prepare panels and frames of each assembly to receive hardware, devices, and accessory units as shown and scheduled. Reinforce work for hardware and devices, and cut work for mortised or concealed units; comply with ANSI A156.115, working from templates supplied by unit manufacturers and suppliers:
 - a. Locate hardware, devices, and accessories as required by Section Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 71 00, DOOR HARDWARE.
 - b. Locate hardware, devices, and accessories as shown and scheduled (including on approved shop drawings) or, if not otherwise indicated: 1) in accordance with ANSI A156.115 and A156.115W Recommended Locations for Builder's Hardware or, 2) in accordance with security device manufacturer's recommendation for optimum responses, but 3) in any case, as required to achieve required assembly performances.
 - c. Except where assembly is equipped with door-seal stripping at jambs and head, provide neoprene door silencers on stops; three at strike jamb for single door, and four at head for double door.
 - d. Except as otherwise indicated, pre-fabricate and preassemble security door assemblies to include full extent of required conduit-protected electrical/electronic power-and-control wiring placed and supported to avoid conflicts with other elements and subsequent drilling/cutting-in of work during installation of units. Provide access ports as required to support 1 inch (25 mm) conduit.
 - e. Clearances: Not more than 1/8 inch (3 mm) at jambs and heads, except not more than 1/4 inch (6 mm) between fire-rated pair of doors. Nor more than 1/4 inch (6 mm) at bottom. Undercut for carpets are not permitted where doors are used in corridors. Fabricate frames with horizontally slotted bolt holes.
2. Shop Painting: Provide base-coat, factory-applied painting of ferrous metal elements of assemblies excluding other specified exposed-finish surfaces of stainless steel, aluminum, bronze, and similar metals not intended for painting.

- a. Clean steel and zinc-coated steel surfaces of mill scale, rust, oil, grease, dirt and other substances, immediately before finish application.
- b. Apply pretreatment of cold phosphate solution (SSPC-SP 2) or basic zinc chromate/vinyl-butyl solution (SSPC-SP 3).
- c. Apply paint coat specified for shop application, and bake on within time limits recommended by manufacturer of pretreatment. Apply in a uniform, smooth coat to result in dry film thickness of not less than 0.002 inch (0.05 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install security door assemblies in accordance with approved shop drawings, manufacturer's data and instructions, and requirements of these specifications. Install as required to achieve specified performances, and to comply with recommendations of related industry association or testing agency sponsoring standards for required non-security performances. Install door assemblies plumb and level:
 1. Install assemblies in compliance with recommendations and instructions of ANSI A250.8 and ANSI A250.11.
 2. Properly hang and align FE doors so that pull open exertion does not exceed 12 lbs (5.4 kg.).
 3. Installer shall not grind any portion of door, frame or locking device strikes.
 4. Locking device strikes shall engage strike plate without binding.
- B. Anchorage: The door manufacturer shall provide anchors appropriate for substrate to which door frame is to be fastened. Structural frames shall have pre-drilled bolt hole patterns not to exceed 12 inches (300 mm) on center. The manufacturer shall verify substrates involved, and supply any special fastening tools (e.g., special drill or bit) required by anchoring system. The anchor shall be acceptable for shock/short duration loading, and have potential for removal during life of building. The anchor shall also meet the following requirements:
 1. Anchor diameter: 3/8 inch (10 mm) minimum.

2. Embedment and edge distances shall be as indicated on Contract Drawings and as appropriate for anchor and substrate, but not less than the following:
 - a. Embedment in concrete: 3 1/2 inches (90 mm).
 - b. Embedment in solid masonry: 6 inches (150 mm).
 - c. Edge distance: 3 inches (75 mm).
3. The minimum anchor strengths shall be:
 - a. Yield Strength: 135,000 psi (900 MPa)
 - b. Tensile Strength: 186,000 psi (1240 MPa)
4. Avoid cutting of rebar during concrete anchor installation. Shims provided for rough opening (RO) frame clearance should not exceed 1/4 inch (6 mm). Cap plugs used in frame shall match frame finish.

3.2 ADJUST AND CLEAN

- A. General: Remove protective coverings and clean exposed surfaces per manufacturers written instructions. Repair damaged elements, restore abraded surfaces, touch-up paint finish per manufactures written instructions.
- B. Check and readjust hardware, devices, and accessories with door-to-frame-and-sill/threshold clearances set for proper operation of locks, door seals, and other operational units. Do not remove permanently applied performance labels.
- C. Comply with "Door Hardware" section requirements for protection and handling of keys and locking devices, and associated information.
- D. Exercise extreme care in the cleaning of exposed surfaces of polycarbonate; comply with manufacturer's directions.

- - - E N D - - -

SECTION 084113
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum-framed storefront window systems.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
4. Include point-to-point wiring diagrams showing the following:
 - a. Power requirements for each electrically operated door hardware.
 - b. Location and types of switches, signal device, conduit sizes, and number and size of wires.

- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Delegated Design Submittal: For aluminum-framed entrances and storefronts including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.
- B. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- C. Structural-Sealant Glazing: Comply with ASTM C1401 for design and installation of storefront systems that include structural glazing.

1.7 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D 4214.
 - c. Cracking, peeling, or chipping.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.

- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings .
- D. Deflection of Framing Members Supporting Glass: At design wind load, as follows:
1. Deflection Normal to Wall Plane: Limited to $1/175$ of clear span for spans of up to 13 feet 6 inches and to $1/240$ of clear span plus $1/4$ inch for spans greater than 13 feet 6 inches .
 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than $1/8$ inch .
 - a. Operable Units: Provide a minimum $1/16$ -inch clearance between framing members and operable units.
- E. Structural: Test in accordance with ASTM E330/E330M as follows:
1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

- F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. .
- G. Water Penetration under Dynamic Pressure: Test in accordance with AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. .
 2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- H. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7 .
1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.6 at design displacement and 1.5 times the design displacement.
- I. Energy Performance: Certified and labeled by manufacturer for energy performance as follows:
1. Thermal Transmittance (U-factor):
 - a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.36 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.
 - b. Entrance Doors: U-factor of not more than 0.77 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.
 2. Solar Heat-Gain Coefficient (SHGC):
 - a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.40 as determined in accordance with NFRC 200.
 - b. Entrance Doors: SHGC of not more than 0.40 as determined in accordance with NFRC 200.
 3. Air Leakage:
 - a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-

air-pressure differential of 6.24 lbf/sq. ft. when tested in accordance with ASTM E283.

4. Condensation Resistance Factor (CRF):
 - a. Fixed Glazing and Framing Areas: CRF for the system of not less than 55 as determined in accordance with AAMA 1503.

J. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested in accordance with AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F .
 - b. Low Exterior Ambient-Air Temperature: 0 deg F .
 - c. Interior Ambient-Air Temperature: 75 deg F .

2.3 SOURCE LIMITATIONS

- A. Obtain all components of storefront system including framing, and accessories from a single manufacturer.

2.4 STOREFRONT SYSTEMS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer Company, Inc.; Arconic Corporation; 451UT or comparable product by one of the following:
 1. EFCO Corporation.
 2. Oldcastle BuildingEnvelope (OBE); CRH Americas, Inc.
 3. Tubelite Inc.
 4. U.S. Aluminum; C.R. Laurence Co., Inc.; CRH Americas, Inc.
 5. Kawneer Company, Inc.; Arconic Corporation.
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 1. Exterior Framing Construction: Thermally broken .
 2. Glazing System: Retained mechanically with gaskets on four sides .
 3. Glazing Plane: Center.
 4. Finish: Color anodic finish .
 - a. Color: Dark Bronze

5. Fabrication Method: Field-fabricated stick system.
6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
7. Steel Reinforcement: As required by manufacturer.

- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.5 GLAZING

- A. Basis of Design: As indicated on drawings.
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.
 1. Color: Match structural sealant.

2.6 MATERIALS

- A. Sheet and Plate: ASTM B209.
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
- C. Structural Profiles: ASTM B308/B308M.
- D. Steel Reinforcement:
 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
- E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance

with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads , finished to match framing system .
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials .
- D. Rigid PVC filler.

2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.

4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 5. Provisions for field replacement of glazing from exterior .
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Storefront Framing: Fabricate components for assembly using shear-block system or screw-spline system .
- F. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.9 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
1. Color: Dark bronze .

2.10 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality-control procedures complying with ASTM C1401 recommendations, including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.

- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Seal perimeter and other joints watertight unless otherwise indicated.
- G. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.
- I. Install joint filler behind sealant as recommended by sealant manufacturer.
- J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF OPERABLE UNITS

- A. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

3.4 INSTALLATION OF GLAZING

- A. Install glazing as recommended by glazing manufacturer.

3.5 INSTALLATION OF WEATHERSEAL SEALANT

- A. After structural sealant has completely cured, remove temporary retainers and insert backer rod between lites of glass as recommended by sealant manufacturer.

- B. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.

3.6 ERECTION TOLERANCES

- A. Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts .
 - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
 - a. Perform a minimum of three tests in areas as directed by Architect.
 - b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion .
 - 2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
 - a. Perform a minimum of three tests in areas as directed by Architect.

- b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion .
 - 3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.
 - C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
 - D. Prepare test and inspection reports.
- 3.8 MAINTENANCE SERVICE
- A. Entrance Door Hardware Maintenance:
 - 1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
 - 2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

END OF SECTION 084113

SECTION 08 71 00
FINISH HARDWARE

PART 1 - GENERAL

1.1 SUMMARY:

- A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.

1. Door hardware for steel (hollow metal) doors.
2. Door hardware for aluminum doors.
3. Door hardware for wood doors.
4. Door hardware for other doors indicated.
5. Keyed cylinders as indicated.

- B. Intent of Hardware Groups

1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

- C. Allowances

1. Refer to Section 01210 for allowance amount and procedures.

- D. Alternates

1. Refer to Section 01230 for Alternates and procedures.

1.2 SUBSTITUTIONS:

- A. Comply with Section 01630

- B. **Approval of equal products must be submitted 15 day prior to bid and be pre-approved. Approval request meeting requirements of section 1 must also contain documentation showing products meet the required standards set in this spec to decrease maintenance costs.**

1.3 SUBMITTALS:

- A. Comply with Section 01330

- B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.

- C. Product Data: Manufacturer's specifications and technical data including the following:

1. Detailed specification of construction and fabrication.
 2. Manufacturer's installation instructions.
 3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
 4. Submit 6 copies of catalog cuts with hardware schedule.
- D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.
1. List groups and suffixes in proper sequence.
 2. Completely describe door and list architectural door number.
 3. Manufacturer, product name, and catalog number.
 4. Function, type, and style.
 5. Size and finish of each item.
 6. Mounting heights.
 7. Explanation of abbreviations and symbols used within schedule.
 8. **Detailed wiring diagrams**, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.
- E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.
1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.
- F. Samples: (If requested by the Architect)
1. 1 sample of Lever and Rose/Escutcheon design, (pair).
 2. 3 samples of metal finishes
- G. Contract Closeout Submittals: Comply with Section 01700 including specific requirements indicated.
1. Operating and maintenance manuals: Submit 3 sets containing the following.
 - a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Parts list for each product.
 2. Copy of final hardware schedule, edited to reflect, "As installed".
 3. Copy of final keying schedule
 4. As installed "Wiring Diagrams" for each piece of hardware connected to power, both low voltage and 110 volts.
 5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.4 QUALITY ASSURANCE

- A. Comply with Section 01440.

1. Statement of qualification for distributor and installers.
2. Statement of compliance with regulatory requirements and single source responsibility.
3. Distributor's Qualifications: Firm with 3 years experience in the distribution of commercial hardware.
 - a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
 - b. Hardware Schedule shall be prepared and signed by an AHC.
4. Installer's Qualifications: Firm with 3 years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.
 - a. Provide UL listed hardware for labeled and 20 minute openings in conformance with requirements for class of opening scheduled.
 - b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.
6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

- B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Comply with Section 01700.
1. Deliver products in original unopened packaging with legible manufacturer's identification.
 2. Package hardware to prevent damage during transit and storage.
 3. Mark hardware to correspond with "reviewed hardware schedule".
 4. Deliver hardware to door and frame manufacturer upon request.
- B. Storage and Protection: Comply with manufacturer's recommendations.

1.6 PROJECT CONDITIONS:

- A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
- B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.7 WARRANTY:

- A. Refer to Conditions of the Contract

B. Manufacturer's Warranty:

1. Closers: 30 years
2. Exit Devices: Five Years
3. Cylindrical Locksets: 5 years years
4. Mortise Locks: **Life of Installation**
5. Cylinders: Three years
6. All other Hardware: Two years.

1.8 OWNER'S INSTRUCTION:

- A. Instruct Owner's personnel in operation and maintenance of hardware units.

1.9 MAINTENANCE:

- A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section.
1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
 2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
 3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.
- B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A.

The manufacturers list below are basis of design to show products similar to the standard set by this owner. All manufacturers below are subject to compliance with requirements of this spec and the contract documents. VA's approval of any of the manufacturers listed below shall be in accordance with their meeting requirements of part 1.7 and 2.2 of this specification, to help reduce long term maintenance costs:

Item:	Manufacturer:
Hinges	Stanley, McKinney, Ives, Bomme
Mortise Locks Locksets -	Best , or pre-approved Schlage,
Sargent equal	
Cylinders	Best PATD Cormax. Owners standard
Exit Devices-Premium	Precision Apex, Von Duprin 98, Sargent 19-88
Pulls	Trimco, Rockwood, Ives
Closers- HD	Stanley HD8016, LCN 4041, Sargent 350
Stops	Trimco, Rockwood, Ives
Flat Goods	Trimco, Rockwood, Ives
Thresholds & Gasketing	National Guard, Pemco, Zero, Reese

2.2 MATERIALS:

Minimum standards are set forth in this section to decrease long term maintainance costs for the owner. ONLY PRODUCTS MEETING OR EXCEEDING THESE STANDARDS, CERTIFIED, AND IN WRITING WILL BE CONSIDERED:

A. Hinges:

1. Template screw hole locations
2. Minimum of 2 permanently lubricated non-detachable bearings
3. Equip with easily seated, non-rising pins
4. Sufficient size to allow 180-degree swing of door
5. Furnish hinges with five knuckles and flush concealed bearings
6. Provide hinge type as listed in schedule.
7. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
8. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
9. UL10B listed for Fire
10. Doors which are 36" wide or smaller shall have 4 ½ x 4 ½ size hinges
11. All doors over 36" wide shall have a continuous hinge as specifies below. This must be pre-approved by owner before the hardware is purchased.
12. All hinges furnished shall have a life of installation warrantee.

B. Mortise Type Locks and Latches:

1. Tested and approved by BHMA for ANSI A156.13, Series 1000, Operational Grade 1, (Cycle Test) - A machine is used to rotate the lever, retract the latch and open the door. Minimum Grade 1 Mortise standard is 1,000,000 cycles. The lockset furnished must exceed grade 1 minimum by 4 million cycles verified by an independent, and recognized testing laboratory. (5 Million total cycles verified)
2. Extra-Heavy Duty, Security Grade 2 and be UL10C
3. ANSI/BHMA A156.13 Attack Resistance (Cylinder Face Impact Test): Cylinder face is hit with a 35lb impact ram, after which the lock must remain locked. The lockset furnished must show independent test lab. Data showing it exceed the minimum standard and withstand at least 25 blows and still functions.
4. Fit ANSI A115.1 door preparation
5. Functions and design as indicated in the hardware groups
6. Solid, one-piece, 3/4-inch (19mm) throw, anti-friction latchbolt made of self-lubricating stainless steel
7. Deadbolt functions shall have 1 inch (25mm) throw bolt made of hardened stainless steel
8. Latchbolt and Deadbolt are to extend into the case a minimum of 3/8 inch (9.5mm) when fully extended
9. Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated
10. Provide sufficient curved strike lip to protect door trim
11. Lever handles must be of forged or cast brass, bronze or stainless steel construction and conform to ANSI A117.1. Levers that contain a hollow cavity are not acceptable
12. Lock shall have self-aligning, thru-bolted trim
13. Levers to operate a roller bearing spindle hub mechanism
14. Mortise cylinders of lock shall have a concealed internal setscrew for securing the cylinder to the lockset. The internal setscrew will be accessible only by removing the core, with the control key, from the cylinder body.

15. Spindle to be designed to prevent forced entry from attacking of lever
16. Provide locksets with 7-pin removable and interchangeable core cylinders
17. Each lever to have independent spring mechanism controlling it
18. Core face must be the same finish as the lockset
19. The Lockset being furnished must also make a multi-Function case to avoid future lock replacement for interior office applications. This lock shall be able to change function without opening the lock case. Owner to designate locations for these locks.
20. Functions and design as indicated in the hardware groups

C. Exit Devices shall:

1. Tested and approved by BHMA for ANSI 156.3, Grade 1 (Cycle Test) Minimum Cycle test requirement 1 Million cycles: Exit Device furnished shall be independently certified to have reached and passed the loaded and unloaded ANSI/BHMA force requirements and passed 10 Million cycle tests.
2. The Exit device head shall be one piece construction made of investment cast brass.
3. Provide a deadlocking latchbolt
4. Non-fire rated exit devices shall have cylinder dogging.
5. Touchpad shall be "T" style
6. Exposed components shall be of architectural metals and finishes.
7. The entire exit device shall incorporate true architectural ANSI/BHMA uniform finish. (Example 603 finish shall be all solid stainless steel)
8. Lever design shall match lockset lever design
9. Provide strikes as required by application.
10. Fire exit devices to be listed for UL10C
11. Provide exit device with multipoint maintenance free rubber noise reduction bumpers
12. Furnish with single spring push bar operation
13. UL listed for Accident Hazard
14. Provide vandal resistant or breakaway trim
15. Vertical rod assemblies to be provided with the manufacturers solid stainless steel rods only.
16. Functions and design as indicated in the hardware groups

A. Surface Door Closers

1. Manufacturers; Surface Mounted:
 - a. Best by dormakaba USA, Inc.
2. Rack and Pinion Aluminum Surface Closers (Heavy Duty - HD8000)
 - a. Provide Full Rack and Pinion type closer constructed of R14 High Silicon Aluminum Alloy, or equal, to exceed the ANSI/BHMA A156.4 Grade 1 requirements.
 - b. Provide closers tested and approved for UL10C for positive pressure; UL228 & CAN/ULC-S133.
 - c. Provide closers that conform to ANSI/ICC A117.1 and ADA requirements for barrier-free accessibility.
 - d. Closer shall be available with heavy-duty arms and knuckles/elbows
 - e. Closer shall have maximum 2 7/16 inch case projection with non-ferrous cover.
 - 1) Closer cover to be:
 - a) Plastic (default)
 - b) Oversized Plastic
 - c) Metal

- d) Lead Lined
 - 2) Closer cover finish to be:
 - a) Painted
 - b) Plated
 - c) RAL Custom Color Powder Coated
 - f. Provide closers with all-weather hydraulic fluid.
 - g. Provide closers with separate adjusting valves for closing and latching speeds, as well as advanced backcheck and delayed action.
 - h. Provide closers with Delayed Action and/or Advanced Backcheck where noted in hardware sets.
 - i. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions.
 - j. Mount closers on non-public side of door and stair side of stair doors, unless otherwise noted in hardware sets.
 - k. Closers shall be non-handed and multi-sized as noted in hardware sets. When specific sized closers are required provide:
 - 1) Size 1 through 6 to meet barrier- free ADA requirements - HD8016
 - 2) Size 5 through 6 - +50% power over size 6 to meet PT4C requirements - HD8056
 - D. Kickplates: Provide with four beveled edges, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.
 - E. Key Operated Devices: All key operated devices shall be able to accept small format BEST interchangeable core PATD Cormax key system. The cost for the core and master key charges shall be included as part of the finished hardware costs for the project. There must be a core allotted for the permanent core submittal for keying. Exceptions are light switches, dispensers, show cases and other items as pre-approved by architect in advance of ordering these items.
 - F. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.
 - G. Key Control: Provide one wall mounted key cabinet complete with hooks, index and tags. Lund or Telkee 2 tag system is acceptable. In addition provide one set of software for key management as produced by Best Access Systems.
 - H. Silencers: Furnish silencers on all interior frames, 3 for single doors, 2 for pairs. Omit where any type of seals occur.
- 2.3 FINISH:
- A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products
 - B. Powder coat door closers to match other hardware, unless otherwise noted.
 - C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.
- 2.4 KEYS AND KEYING:
- A.** Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's

permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. **Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner, as part of this contract, for every cylinder on the project.**

- B. Provide sufficient cores to secure the building and 10 extra cores if required for interior lockup areas.
- C. Cylinders, removable and interchangeable core system: Best PATD CORMAX 7-pin, Key System patented thru May 2027..
- D. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."
- E. **All key operated devices shall be able to accept the Owners small format BEST interchangeable core key system. The cost for the core and master key chargews shall be included as part of the finished hardware costs for the project. There must be a core allotted for the permanent core submittal for keying. Exceptions are light switches, dispensers, show cases and other items as pre-approved in advance of ordering these items.**
- F. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.
- G. Furnish keys in the following quantities:
 - 1. 1 each Grand Masterkeys
 - 2. 4 each Masterkeys
 - 3. 3 each Change keys each keyed core
 - 4. 15 each Construction masterkeys
 - 5. 25 each or as required -brass construction core for construction
 - 6. 1 each Control keys
- H. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- I. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.
 - 1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 HARDWARE LOCATIONS:

- A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.
 - 1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).
 - 2. NWWDA Industry Standard I.S.1.7, Hardware Locations for Wood Flush Doors.

3.3 INSTALLATION:

- A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- B. **The Installer must verify in writing that all hardware is installed per the manufacturer's instructions prior to the architects final punch list. Any items found to not be in compliance with correct installation instructions shall be reported to the Architect prior to his final punch list. All incorrectly installed items shall be re-installed correctly at no added expense to the owner or the contractor.**
- C. **Before Hardware installation verify the following: That the doors and frames are properly prepared to receive the specified hardware. Hollow metal frames shall be prepared for ANSI strike plates per A115.1-2 (4 7/8" High), "all" hinge preps will be mortised and or reinforced with a manufacturers recommended reinforcing material. All closer shall have reinforcement which shall be a minimum of 8 gauge. Hollow Metal Doors shall be properly reinforced with a minimum of 16 gauge material for either mortised or cylindrical lacks as specified by the owner. It is preferred that all hollow metal doors receiving door closers have 12 gauge reinforcement. Wood doors shall be "Factory" prepped to receive the scheduled hardware and comply with ANSI A115-W and fire rated wood doors be UL10C - TYPE A door with Hot seal build into the edges.**
- D. **All openings with Access Control shall have frames and doors prepped with Electric Power Transfers (EPT) for long term access control reliability and maintainance.**
- E. **Sex Bolts are mandatory for all exit device and closer installation.**
- F. Conform to local governing agency security ordinance.
- G. ADA Standard: Conform to ANSI A117.1 for positioning requirements for disabled.
- H. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.
- I. **Thresholds shall be set in a continuous bed of Polyurethane or butle rubber Calk. Contractor to verify "Squeeze Out" befor it is trimmed off. This will ensure a water tight seal under and around each threshold.**

3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

- A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.
1. Check and adjust closers to ensure proper operation.
 - a. Adjust closer to complete full closing cycle in less than 4 to 6 seconds without abrupt change of speed between "Sweep" and "Latch" speeds.
 - b. Adjust "Backcheck" according to manufacturer's instructions.
 - c. Set exterior doors closers to have 8.5 lbs maximum pressure to open, interior non-rated at 5 lbs, rated openings at 12 lbs
 2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.
 - a. Verify levers are free from binding.
 - b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.
 3. Report findings, in writing, to architect and hardware supplier outlining corrective actions and recommendations.

3.5 SCHEDULE OF FINISH HARDWARE:

Manufacturer List

<u>Code</u>	<u>Name</u>
BE	Best Access Systems
BY	By Others
NA	National Guard
OTHE	Others
ST	Stanley
TR	Trimco
GLY	Glynn-Johnson

Option List

<u>Code</u>	<u>Description</u>
C	Quick Connect Wiring System
18	CONCEALED WIRES - 18 AWG (8)
CE	CONC/WIRE-USE WITH 10,18,54,56,58,66 SUF
HT	HOSPITAL TIPS-HEAVY WEIGHT
CSK	COUNTER SINKING OF KICK and MOP PLATES
RQE	REQUEST TO EXIT
DA AVB	Del. Action & Adv. Variable Backcheck
ADHESIVE-KP	ADHESIVE APPLICATION- KICKPLATE
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES

Finish List

<u>Code</u>	<u>Description</u>
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
626AM	Satin Chrome - Antimicrobial Coating
US26D	Chromium Plated, Dull

Hardware Sets

Hardware Group No. 001

For use on Door #(s): 01-113B.0, 01-217C.0, 01-315C.0, 02-B1B.0, 02-222.0, 03-103.1, 05-211.1, 06-102.1, 07-110.0, 08-107.0, 11-001.0, B001A.0 12-D003.0, 12-C004.0, 12-A119.1, 12-C106D.0, 12-C208.0, 12-B303.0, 12-404C.0, 14-105.0, 53-102B.0,

EHRM ROOM OUTSWING W/ CR

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW HT 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1HW HT 4.5 X 4.5 CON TW8	✓ 652	IVE
1	EA	FAIL SECURE ELEC LOCK	L9092HDEU 17L CON 12/24 VDC	✓ 626AM	SCH
1	EA	PERMANENT CORE	BEST CORMAX (KEY AS DIRECTED BY OWNER)	626	BES
1	EA	LOCK GUARD	LG12 (PAINT TO MATCH DOOR/ FRAME)	600	IVE
1	EA	SURFACE CLOSER (W/ SPRING STOP, DELAY CLOSE)	4041 DEL SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488S @ HEAD & JAMBS	BK	ZER
1	SET	WIRE HARNESSSES	QTY/ LENGTH/ TYP AS REQ'D	✓	SCH
1	EA	CARD READER	PROVIDED BY SECURITY VENDOR	✓	
1	EA	LOW VOLTAGE POWER	PROVIDED BY SECURITY VENDOR	✓	
1	EA	DOOR POSITION SWITCH	PROVIDED BY SECURITY VENDOR	✓	

Hardware Group No. 002

For use on Door #(s): 12-A038.0, 65-109.3

EHRM ROOM-OUTSWING W/ CR

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
5	EA	HINGE	5BB1HW HT 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1HW HT 4.5 X 4.5 CON TW8	✓ 652	IVE
1	SET	CONSTANT LATCHING FLUSH BOLT	845/945 AS REQ'D BY DOOR MATERIAL	626	DCI
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ'D	626	IVE
1	EA	FAIL SECURE ELEC LOCK	L9092HDEU 17L CON 12/24 VDC (W/ FLAT LIP STRIKE)	✓ 626AM	SCH
1	EA	PERMANENT CORE	BEST CORMAX (KEY AS DIRECTED BY OWNER)	626	BES
1	EA	COORDINATOR	COR X FL X MB AS REQUIRED	628	IVE
2	EA	SURFACE CLOSER (W/ DELAY CLOSE & STOP ARM)	4041 DEL SCUSH X ST-2648	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488S @ HEAD & JAMBS	BK	ZER
1	EA	OVERLAPPING ASTRAGAL	383AA	AA	ZER
1	SET	WIRE HARNESSSES	QTY/ LENGTH/ TYP AS REQ'D	✓	SCH
1	EA	CARD READER	PROVIDED BY SECURITY VENDOR		
1	EA	LOW VOLTAGE POWER	PROVIDED BY SECURITY VENDOR		
1	EA	DOOR POSITION SWITCH	PROVIDED BY SECURITY VENDOR		

Hardware Group No. 003

For use on Door #(s): NOT USED

EHRM ROOM IN-SWING NO CR

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW HT 4.5 X 4.5	652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056HD 17L L583-363	626AM	SCH
1	EA	PERMANENT CORE	BEST CORMAX (KEY AS DIRECTED BY OWNER)	626	BES
1	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	GASKETING	488S @ HEAD & JAMBS	BK	ZER

Hardware Group No. 004

For use on Door #(s): 01-B003A.0, 65-100B.0, 66-132.0

EHRM ROOM EXTERIOR OUTSWING W/ CR

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW HT 4.5 X 4.5	630	IVE
1	EA	ELECTRIC HINGE	5BB1HW HT 4.5 X 4.5 CON TW8	✓ 630	IVE
1	EA	FAIL SECURE ELEC LOCK	L9092HDEU 17L CON 12/24 VDC	✓ 626AM	SCH
1	EA	PERMANENT CORE	BEST CORMAX (KEY AS DIRECTED BY OWNER)	626	BES
1	EA	LOCK GUARD	LG12 (PAINT TO MATCH DOOR/ FRAME)	600	IVE
1	EA	SURFACE CLOSER (W/ SPRING STOP, DELAY CLOSE)	4041 DEL SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	429AA @ HEAD & JAMBS	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	SET	WIRE HARNESSSES	QTY/ LENGTH/ TYP AS REQ'D	✓	SCH
1	EA	CARD READER	PROVIDED BY SECURITY VENDOR	✓	
1	EA	LOW VOLTAGE POWER	PROVIDED BY SECURITY VENDOR	✓	
1	EA	DOOR POSITION SWITCH	PROVIDED BY SECURITY VENDOR	✓	

Hardware Group No. 005

For use on Door #(s): 01-B003B.0

EXIT EXTERIOR OUTSWING NO CR

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW HT 4.5 X 4.5	630	IVE
1	EA	STOREROOM LOCK	L9080HD 17L	626AM	SCH
1	EA	PERMANENT CORE	BEST CORMAX (KEY AS DIRECTED BY OWNER)	626	BES
1	EA	LOCK GUARD	LG12 (PAINT TO MATCH DOOR/ FRAME)	600	IVE
1	EA	SURFACE CLOSER (W/ SPRING STOP, DELAY CLOSE)	4041 DEL SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	429AA @ HEAD & JAMBS	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER

Hardware Group No. 006

For use on Door #(s): 65-109A.0
EXTERIOR OUTSWING NO CR

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW HT 4.5 X 4.5	630	IVE
1	EA	STOREROOM LOCK	L9080HD 17L	626AM	SCH
1	EA	PERMANENT CORE	BEST CORMAX (KEY AS DIRECTED BY OWNER)	626	BES
1	EA	LOCK GUARD	LG12 (PAINT TO MATCH DOOR/ FRAME)	600	IVE
1	EA	SURFACE CLOSER (W/ SPRING STOP, DELAY CLOSE)	4041 DEL SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	429AA @ HEAD & JAMBS	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER

Hardware Group No. 007

For use on Door #(s): 01-217B.0, 01-315B.0, 10-B002.1, 10-B002.2, 18-002.0
EXIT INTERIOR OUTSWING NO CR

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW HT 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 17L	626AM	SCH
1	EA	PERMANENT CORE	BEST CORMAX (KEY AS DIRECTED BY OWNER)	626	BES
1	EA	SURFACE CLOSER (W/ SPRING STOP, DELAY CLOSE)	4041 DEL SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488S @ HEAD & JAMBS	BK	ZER

- - - E N D - - -

SECTION 08 90 00
LOUVERS AND VENTS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies fixed and operable wall louvers, door louvers and wall vents.

1.2 RELATED WORK:

- A. Section 23 31 00, HVAC DUCTS AND CASINGS.

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. Each type of louver and vent, showing material, finish, and size of members.
- C. Color samples.

1.4 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. The Master Painters Institute (MPI):
 - 1. Approved Product List - Updated Monthly
- C. ASTM International (ASTM):
 - 1. A240/A240M-14 Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - 2. A653/A653M-13 Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
 - 3. A1008/A1008M-13 Steel, Sheet, Carbon, Cold Rolled, Structural, and High Strength Low-Alloy with Improved Formability
 - 4. B209-14 Aluminum and Aluminum Alloy, Sheet and Plate
 - 5. B209M-14 Aluminum and Aluminum Alloy, Sheet and Plate (Metric)
 - 6. B221-14 Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

7. B221M-13 Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
 8. D1187/D1187M-97(R2011) Asphalt-Base Emulsions for Use as Protective Coatings for Metal
- D. National Association of Architectural Metal Manufacturers (NAAMM):
1. AMP 500-06 Metal Finishes Manual
- E. National Fire Protection Association (NFPA):
1. 90A-15 Installation of Air Conditioning and Ventilating Systems
- F. American Architectural Manufacturers Association (AAMA):
1. 2605-13 High Performance Organic Coatings on Architectural Extrusions and Panels
- G. Air Movement and Control Association, Inc. (AMCA):
1. 500-L-07 Testing Louvers

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Aluminum, Extruded: ASTM B221M (B221).
- B. Aluminum, Plate and Sheet: ASTM B209M (B209); alloy 3003 or 5005 with temper as required for forming.
- C. Fasteners: Fasteners for securing louvers to adjoining construction, except as otherwise specified or indicated in construction documents, to be toggle or expansion bolts of size and type as required for each specific type of installation and service condition.
1. Where type, size, or spacing of fasteners is not shown or specified, submit shop drawings showing proposed fasteners, and method of installation.
 2. Fasteners for louvers, louver frames, and wire guards to be of stainless steel with same finish as louvers.
 3. Fasteners for louvers, louver frames and wire guards within mental health areas to be non-removable/tamper-proof type.

2.2 EXTERIOR WALL LOUVERS:

- A. General:
1. Provide fixed type louvers of size and design shown.

2. Heads, sills and jamb sections are to have formed caulking slots or be designed to retain caulking. Head sections are to have exterior drip lip, and sill sections an integral water stop.
3. Furnish louvers with sill extension or separate sill as shown.
4. Frame is to be mechanically fastened or welded construction with welds dressed smooth and flush.

B. Aluminum Louvers:

1. General: Frames, blades, sills, and mullions (sliding interlocking type); 2 mm (0.078-inch) thick extruded 6063-T5 or -T52 aluminum. Blades to be drainable type and have reinforcing bosses.
2. Louvers, fixed: Make frame sizes 13 mm (1/2-inch) smaller than openings. Single louvers frames are not to exceed 1676 mm (66 inches) wide. When openings exceed 1676 mm (66 inches), provide twin louvers separated by mullion members.
3. Louvers are to withstand the effects of gravity loads and the following wind loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors.
 - a. Wind load acting inward or outward of not less than 1436 Pa (30 lb. per sq. ft.).

2.3 CLOSURE ANGLES AND CLOSURE PLATES:

- A. Fabricate from 2 mm (0.078-inch) thick stainless steel or aluminum.
- B. Provide continuous closure angles and closure plates on inside head, jambs and sill of exterior wall louvers.
- C. Secure angles and plates to louver frames with screws, and to masonry or concrete with fasteners as indicated in construction documents.

2.4 WIRE GUARDS:

- A. Provide wire guards on outside of all exterior louvers.
- B. Fabricate frames from 2 mm (0.078-inch) thick extruded or sheet aluminum or 1.5 mm (0.059-inch) thick stainless steel designed to retain wire mesh.
- C. Wire mesh to be woven from not less than 1.6 mm (0.063-inch) diameter aluminum wire or 1.3 mm (0.05-inch) diameter stainless steel wire in 13 mm (1/2-inch) square mesh.

- D. Miter corners and join by concealed corner clips or locks extending not less than 57 mm (2-1/4 inches) into rails and stiles. Equip wire guards over 1219 mm (4 feet) in height with a mid-rail constructed as specified for frame components.
- E. Fasten frames to outside of louvers with aluminum or stainless steel devices of same finish as louvers designed to allow removal and replacement without damage to the wire guard or the louver.

2.5 FINISH:

- A. In accordance with NAAMM Metal Finishes Manual: AMP 500-505
- B. Aluminum Louvers:
 - 1. Anodized finish
 - a. AA-M1X, Mill finish, as fabricated.

2.6 PROTECTION:

- A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with a heavy coat of bituminous coating (complete coverage), or by separating the contact surfaces with a performed synthetic rubber tape having pressure sensitive adhesive coating on one side.
- B. Isolate the aluminum from plaster, concrete and masonry by coating aluminum with zinc-chromate primer.
- C. Protect finished surfaces from damage during fabrication, erection, and after completion of the work. Strippable plastic coating on colored anodized or organic finishes is not approved.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Set work accurately, in alignment and where indicated in construction documents. Install plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Furnish setting drawings and instructions for installation of anchors and for the positioning of items having anchors to be built into masonry construction. Provide temporary bracing for such items until masonry is set.
- C. Provide anchoring devices and fasteners as shown and as necessary for securing louvers to building construction as specified. Power actuated drive pins may be used, except for removal items and where members would be deformed or substrate damaged by their use.

- D. Set wall louvers in masonry walls during progress of the work. If wall louvers are not delivered to job in time for installation in prepared openings, make provision for later installation. Set in cast-in-place concrete in prepared openings.

3.2 CLEANING AND ADJUSTING:

- A. After installation, all exposed prefinished and plated items and items fabricated from stainless steel or aluminum are to be cleaned as recommended by the manufacturer and protected from damage until completion of the project.
- B. All movable parts, including hardware, are to be cleaned and adjusted to operate as designed without binding or deformation of the members, so as to be centered in the opening of frame, and where applicable, to have all contact surfaces fit tight and even without forcing or warping the components.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful (as determined by COR), damaged units and replace with new units.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 09 05 16
SUBSURFACE PREPARATION FOR FLOOR FINISHES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies subsurface preparation requirements for areas to Receive the installation of new flooring.
- B. This section includes removal of existing floor coverings, floor leveling and repair as indicated on the drawings and specified in this section.
- C. Preparation of existing slab in B157 to receive new access flooring support pedestal base adhesive.

1.2 RELATED WORK

- A. Section 07 92 00, JOINT SEALANTS.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA and TEST DATA.
- B. Written approval confirming product compatibility with subfloor material manufacturer and the flooring manufacturer
- C. Product Data:
 - 1. Cementitious Trowel-Applied Underlayment
- D. Test Data:

1.4 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.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. ASTM International (ASTM):
 - D4259-18(2019)Standard Practice for Preparation of Concrete by Abrasion Prior to Coating Application.
 - F710-1e1(2020)Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

PART 2 - PRODUCTS

2.1 CEMENTITIOUS TROWEL-APPLIED UNDERLAYMENT/PATCHING

- A. Product shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.
- B. Compressive Strength: Minimum 4000 psi in 28 days
- C. Product shall not contain silica quartz (sand).
- D. Dry Time: Product shall receive the application of floor covering in 120 minutes.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before testing and not less than three days after testing.
- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation.
- C. Do not install materials when the temperatures of the substrate or materials are not within 60-85 degrees F/ 16-30 degrees C.

3.2 SURFACE PREPARATION

- A. Existing concrete slabs with existing floor coverings:
 - 1. Conduct visual observation of existing floor covering for adhesion, water damage, alkaline deposits, and other defects.
 - 2. Remove existing floor covering and adhesives. Comply with local, state and federal regulations and the RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to the floor covering being removed and specification section 02 82 11 ASBESTOS REMEDIATION if existing floor tile and/or mastic contains asbestos fibers.
- B. Existing concrete slab shall be sound, solid, clean, and free of all oil, grease, dirt, curing compounds, and any substance that might act as a bond-breaker before application. As required prepare slab by mechanical methods. No chemicals or solvents shall be used.
- C. General: Prepare and clean substrates according to flooring manufacturer's written instructions for substrate indicated.
- D. Prepare concrete substrates in B157 per access flooring pedestal adhesive requirements as follows:

1. Vacuum-assisted abrasive blasting.

3.3 CEMENTITIOUS UNDERLAYMENT

- A. Mix and apply in accordance with manufacturer's instructions.

3.4 PROTECTION

- A. Prior to the installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, tempered hardwood, or other suitable protection course

- - - E N D - - -

---THIS PAGE LEFT INTENTIONALLY BLANK---

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 09 06 00
SCHEDULE FOR FINISHES

PART I - GENERAL

1.1 DESCRIPTION

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 MANUFACTURES

Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Product 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 SUBMITTAL

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.

1.4 APPLICABLE PUBLICATIONS

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

B. MASTER PAINTING INSTITUTE: (MPI)
2001.....Architectural Painting Specification Manual

PART 2- PRODUCTS

2.1

A. See color and texture requirements under the following specification sections and on finish schedule on drawing GI-002:

04 20 05	Brick Unit Masonry
07 51 13.13	Cold-Applied Built-Up Asphalt Roofing
07 53 23.15	Ethylene-Propylene-Diene-Monomer Roof (EPDM) System) Patching
07 84 00	Firestopping

07 92 00	Joint Sealants
08 11 10	Hollow Metal Doors and Frames
08 14 16	Flush Wood Veneer Doors
08 31 13	Access Doors and Frames
08 34 53	Security Doors
08 71 00	Door Hardware
08 90 00	Louvers and Vents
09 65 13	Resilient Base
09 65.36.13	Static Dissipative Resilient Flooring
09 91 00	Painting
10 14 00	Signage
10 44 13	Fire Extinguisher Cabinets

2.2 ROOM FINISH SCHEDULE FOR SURFACES OUTSIDE OF THE TELECOMMUNICATIONS ROOMS

A. For paint colors of corridors side of walls, door frames, HM doors, wall base match adjacent existing colors. Match adjoining or existing similar surfaces colors, textures or patterns where disturbed or damaged by alterations or new work.

2.3 COLORS INSIDE OF TELECOMMUNICATION ROOMS

A. Paint- Sherwin Williams Extreme White 500 Sheen Glossy
(Color for both fire retardant paint on plywood backer boards, Gyp Bd walls and exiting ceiling framing and deck).

Static Dissipative Tile- Armstrong #51951 Armor Grey

Rubber Base- Roppe Pinnacle Type TS #193 Brown/Black

2.4 TELCOM ROOM FIRE RATING LABEL ON PLYWOOD BACKER BOARDS

A. See requirement under specification section 06 10 00 ROUGH CARPENTRY for preservation of one rating stamp on each sheet of plywood.

PART 3 - EXECUTION

3.1 FINISH SCHEDULE

Electronic Health Records Modernization
(EHRM) Infrastructure Upgrades
Hot Springs VA Medical Center
Project No. 568A4-21-702

09 06 00 - 2 of 3
SCHEDULE FOR FINISHES

- A. See requirements in individual specification sections and on
Drawing GI-002.

---THIS PAGE LEFT INTENTIONALLY BLANK---

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies steel studs wall systems, shaft wall systems, suspended ceilings, fasteners, and accessories for the screw attachment of gypsum board system.

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. Pull down tabs in steel decking: Section 05 36 00, COMPOSITE METAL DECKING.
- D. Ceiling suspension systems for acoustical tile and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS

1.3 TERMINOLOGY

- A. Description of terms shall 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 shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists.

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. Metal stud and furring construction system including details around openings and corner details.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

In accordance with the requirements of ASTM C754.

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)
- A641-09Zinc-Coated (Galvanized) Carbon Steel Wire
- A653/653M-11Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
- C11-10Terminology Relating to Gypsum and Related Building Materials and Systems
- C635-07Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings
- C636-08Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
- C645-09Non-Structural Steel Framing Members
- C754-11Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
- C841-03 (R2008)Installation of Interior Lathing and Furring
- C954-10Steel 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
- E580-11Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint.

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G40 or equivalent.

2.2 STEEL STUDS AND RUNNERS (TRACK)

- A. ASTM C645, modified for thickness specified and sizes as shown.
1. Use C 645 steel, 0.75 mm (0.0296-inch) minimum base-metal (30 mil).
 2. Runners same thickness as studs.

3. Exception: Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012) need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C 645. The submission of an evaluation report is acceptable to show conformance to this requirement. Use C 645 steel, 0.48mm (0.019 inch) minimum base-metal (19 mil).
- B. 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.
- C. Doubled studs for openings and studs for supporting concrete backer-board.
- D. Studs 16 feet or less in length shall be in one piece.
- E. Shaft Wall Framing:
 1. Conform to rated wall construction.
 2. C-H Studs or C-T Studs.
 3. E Studs.
 4. J Runners.
 5. Steel Jamb-Strut.

2.3 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

- A. 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 in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.
- E. Attachments for Wall Furring:
 1. Manufacturers 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.
- F. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

- A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.
- B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

- A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.
- B. Space studs not more than 610 mm (24 inches) on center.
- C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.
- D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.
- E. Extend studs to underside of structure overhead for fire, rated partitions, smoke partitions, shafts, and sound rated partitions and insulated exterior wall furring.
- F. At existing plaster ceilings and where shown, studs may terminate at ceiling as shown on drawings.
- G. Openings:
 - 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.
 - 2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
 - 3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.
- H. Fastening Studs:
 - 1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.

2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.

I. Chase Wall Partitions:

1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
2. Use studs or runners as cross bracing not less than 63 mm (2-1/2 inches wide).

J. Form building seismic or expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of the seismic or expansion joint.

K. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.

B. Wall furring-Stud System:

1. Framed with 63 mm (2-1/2 inch) or narrower studs, 600 mm (24 inches) on center.
2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.

C. Direct attachment to masonry or concrete; rigid channels or "Z" channels:

1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center, horizontally or vertically.
2. Install "Z" furring channels vertically spaced not more than 600 mm (24 inches) on center.
3. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.
4. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
5. Fasten furring channels to walls with power-actuated drive pins or hardened steel concrete nails. Where channels are spliced, provide two fasteners in each flange.
6. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection

instructions. Locate "Z" channels within 100 mm (4 inches) of corner.

- D. Installing Wall Furring-Bracket System: Space furring channels not more than 400 mm (16 inches) on center.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

- A. Provide for attachment and support of electrical outlets, plumbing, laboratory or heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, wood seats, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction.
- B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

3.5 TOLERANCES

- A. Fastening surface for application of subsequent materials shall not vary 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.)

- - - E N D - - -

GYPSUM BOARD
SECTION 09 29 00

PART 1 GENERAL

1.1 DESCRIPTION

- A. This section specifies installation and finishing of 5/8-inch Type X gypsum board and 5/8-inch sound damping gypsum board.

1.2 RELATED WORK

- A. Section 09 91 00 PAINTING.

1.3 TERMINOLOGY

- A. Definitions and description of terms shall be in accordance with ASTM C-11, C-840, 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.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

- A. In accordance with the requirements of ASTM C-840.

1.6 ENVIRONMENTAL CONDITIONS

- A. In accordance with the requirements of ASTM C-840.

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. American Society for Testing and Materials (ASTM):
- | | |
|---------|--|
| C11-08 | Terminology Relating to Gypsum and Related Building Materials and Systems |
| C475-02 | Joint Compound and Joint Tape for Finishing Gypsum Board |
| C840-08 | Application and Finishing of Gypsum Board |
| C954-07 | Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. to 0.112 in. in thickness |

C1002-07Steel Self-Piercing Tapping Screws for the
Application of Gypsum Panel Products or Metal
Plaster Bases to Wood Studs or Steel Studs

C1047-05Accessories for Gypsum Wallboard and Gypsum
Veneer Base

C1396-06Gypsum Board

E84-08Surface Burning Characteristics of Building
Materials

- C. Underwriters Laboratories Inc. (UL):
Latest EditionFire Resistance Directory
- D. Inchcape Testing Services (ITS):
Latest EditionsCertification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

- A. Gypsum Board: ASTM C-1396, Type X, 5/8-inch thick.

2.2 ACCESSORIES

- A. ASTM C1047, except form of 0.015-inch thick zinc coated steel sheet or rigid PVC plastic.
- B. Flanges not less than 7/8-inch wide with punch outs or deformations as required to provide compound bond.

2.3 FASTENERS

- A. ASTM C-1002 and ASTM C-840, except as otherwise specified.
- B. ASTM C-954, for steel studs thicker than 0.33-inch.
- C. Select screws of size and type recommended by the manufacturer of the material being fastened.
- D. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.4 FINISHING MATERIALS AND LAMINATING ADHESIVE

- A. ASTM C-475 and ASTM C-840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

2.5 SOUND DAMPING BOARD MATERIAL BASIS OF DESIGN

- A. Material Basis of Design: QuietRock® EZ-Snap, manufactured by PABCO® Gypsum.
- B. Panel Physical Characteristics:
1. Thickness: 5/8-inch.
 2. Tolerance: ±0.050-inch on thickness.

3. Weight: 2.6 lbs./SF.
4. Materials: Paper faced gypsum, sound damping viscoelastic polymer core.
5. STC Rating: 51 (ASTM E-90) in a 2 layer wall assembly with full thickness acoustical insulation.
6. Fire-rated: 1 Hour (ASTM E-119).
7. Surface Flame: Class A (ASTM E-84).

C. Or Approved Equal.

PART 3 - EXECUTION

3.1 INSTALLING GYPSUM BOARD

- A. Coordinate installation of gypsum board with other trades and related work.
- B. Install board in accordance with ASTM C-840, except as otherwise specified.
- C. Use boards in maximum practical lengths to minimize number of end joints.
- D. Bring board into contact, but do not force into place.
- E. 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.
- F. Walls:
 1. When board is installed parallel to framing members, space fasteners 12 inches on center in field of the board, and 8 inches on center along edges.
 2. When board is installed perpendicular to framing members, space fasteners 12 inches on center in field and along edges.
 3. Stagger screws on abutting edges or ends.
 4. No offset in exposed face of walls and partitions will be permitted.
- H. Electrical and Telecommunications Boxes:
 1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.
- I. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
 - a. Install at all vertical and horizontal external corners and where shown.
 - b. Use screws only. Do not use crimping tool.
4. Edge Trim (casings Beads):
 - a. At both sides of expansion and control joints unless shown otherwise.
 - b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.
 - c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.

3.2 FINISHING OF GYPSUM BOARD AND SOUND DAMPING BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C-840. Match the buildings existing gypsum board finish and texture for all finished areas open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:
 1. Board is fastened and held close to framing or furring.
 2. Fastening heads in board are slightly below surface in dimple formed by driving tool.

3.3 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 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 1/2-inch diameter, or equivalent size, with gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.

3.4 SOUND DAMPING BOARD INSTALLATION REQUIREMENTS

- A. Install board in accordance with GA-201, GA-216, GA-600, ASTM E-90, and manufacturer's instructions.
- B. Install in accordance with manufacturer's instructions, product technical bulletins, product catalog and product carton instructions for installation.
- C. Isolate perimeter of sound damping board applied to non-load bearing partitions at structural abutments, except floors. Provide 1/4-inch to 1/2-inch wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant. Add backer rods where necessary to complete continuous seal integrity.
- D. Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant in accordance with ASTM E-90. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C-919 and with additional manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- E. Cut sound damping board to fit around any electrical boxes or openings in the wall, as needed, using a standard hand or power saw. Sound damping board panels require a higher tooth-per-inch count on jigsaw blades (such as 16-25 tpi) as some layers contain light gauge metal, or you may use a circular saw.
- F. Secure board to the studs using type 'S' or 'S12' drywall screws (every 16-inch minimum). Use fine thread fasteners.
- G. Apply QuietSeal® Pro or similar in accordance with ASTM E-90 and manufacturer's instructions.
- H. Use board or similar behind outlet or other boxes. Wrap the putty completely around the back side of the box.

- - END - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 095113
ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes acoustical panels (ATC-#) and exposed suspension systems for interior ceilings.
- B. Related Requirements:
 - 1. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Ceiling suspension-system members.
 - 2. Structural members to which suspension systems will be attached.
 - 3. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
 - 5. Size and location of initial access modules for acoustical panels.
 - 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Speakers.

- e. Sprinklers.
- f. Access panels.
- g. Perimeter moldings.
- 7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
- 8. Minimum Drawing Scale: 1/8 inch = 1 foot .

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency .

D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials , from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
- 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.
- B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 .
- C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame-Spread Index: Class A according to ASTM E 1264.
 2. Smoke-Developed Index: 50 or less.
- D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS (ATC-#)

- A. Basis-of-Design Equipment or VA Approved Equal: Subject to compliance with requirements, provide Armstrong 915, 2'x4' tile that is compatible with existing ceiling grid system or comparable product approved by the VA by one of the following:
 1. Armstrong Ceiling & Wall Solutions.
 2. Certainteed; SAINT-GOBAIN.
 3. Rockfon; ROCKWOOL International.
 4. USG Corporation.
- B. Replacement/Patch and Repair: Replace ceiling tiles, suspension system, and accessories with a matching acoustical ceiling system to the adjacent existing ceiling system.

- C. Classification: Provide fire-resistance-rated panels as follows:
 - 1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with vinyl overlay on face and back .
 - 2. Pattern: E (lightly textured) .
- D. Color: As indicated on Drawings .
- E. Light Reflectance (LR): Not less than 0.80 .
- F. Ceiling Attenuation Class (CAC): Not less than [23] .
- G. Noise Reduction Coefficient (NRC): Not less than 0.80 .
- H. Articulation Class (AC): Not less than 170 .
- I. Edge/Joint Detail: As indicated on drawings .
- J. Thickness: As indicated on Drawings .
- K. Thickness: As indicated on Drawings .
- L. Modular Size: [] As indicated on Drawings .
- M. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong Ceiling & Wall Solutions.
 - 2. Certainteed; SAINT-GOBAIN.
 - 3. Rockfon; ROCKWOOL International.
 - 4. USG Corporation.
- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.
 - 1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C 635/C 635M.
- C. Wide-Face, Capped, Double-Web, Fire-Rated, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30

coating designation; with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Intermediate -duty system.
2. End Condition of Cross Runners: Override (stepped) type.
3. Face Design: Flat, flush.
4. Cap Material: Cold-rolled steel .
5. Cap Finish: Painted in color as selected from manufacturer's full range .

2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch-diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.
- F. Hold-Down Clips: Manufacturer's standard hold-down.
- G. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.
- H. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

- I. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- J. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- K. Clean-Room Gasket System: Where indicated, provide manufacturer's standard system, including manufacturer's standard antimicrobial gasket and related adhesives, tapes, seals, and retention clips, designed to seal out foreign material from and maintain positive pressure in clean room.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product from approved ceiling manufacturer or comparable product by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Certainteed; SAINT-GOBAIN.
 - 3. Rockfon; ROCKWOOL International.
 - 4. USG Corporation.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
 - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.7 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636/C 636M , seismic design requirements, and manufacturer's written instructions.
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled

- mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
 5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 6. Install seismic clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
 - a. Hold-Down Clips: Space 24 inches o.c. on all cross runners.
 7. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.

8. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet , non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet , non-cumulative.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
 1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.6 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 09 65 13

RESILIENT BASE

PART 1 GENERAL

1.1 DESCRIPTION

A. This section specifies the installation of rubber wall 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: 6 inches long, each type and color.

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

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. The publication 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):

F1861-08.....Resilient Wall Base

C. Federal Specifications (Fed. Spec.):

RR-T-650E.....Treads, Metallic and Non-Metallic, Nonskid

PART 2 PRODUCTS

2.1 GENERAL

Use only products by the same manufacturer and from the same production run.

2.2 RESILIENT BASE

A. ASTM F-1861, 1/8-inch thick, 4 inches high, Group 2, Style A -straight for carpeted areas.

B. Basis of Design: Roppe 700 Series Rubber Base or VA approved equal.

2.3 ADHESIVES

A. Use products recommended by the material manufacturer for the conditions of use.

B. Use low-VOC adhesive.

PART 3 EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the COR.

3.2 BASE INSTALLATION

A. Location: See drawings.

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 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.

3.3 CLEANING AND PROTECTION

A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.

B. Clean and polish materials in the following order:

1. After two weeks, scrub resilient base 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.

- - END - -

SECTION 09 65 36
STATIC DISSIPATIVE RESILIENT FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies the installation of static dissipative resilient flooring.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
- C. Removal of Existing Construction Containing Asbestos: Section 02 82 00, ASBESTOS FLOOR TILE AND MASTIC ABATEMENT.
- D. Color, Pattern and Texture for Static Dissipative Resilient Tile Flooring and Accessories: 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. Sustainable Design Submittals as described below:
1. Volatile organic compounds per volume as described in PART 2 - PRODUCTS.
 2. Postconsumer and preconsumer recycled content as described in PART 2 - PRODUCTS.
- C. Manufacturer's Literature and Data:
1. Description of each product.
 2. Resilient material manufacturer's recommendations for adhesives, underlayment, primers, and polish.
 3. Application, installation and maintenance instructions.
- D. Samples:
1. Tile: Each type, color, thickness and finish.
 2. Edge Strips: Each type, color, thickness and finish.
 3. Feature Strips: Each type, color, thickness and finish.
- E. Shop Drawings:
1. Layout of patterns as shown on the construction documents.
 2. Edge strip locations showing types and detail cross sections.
 3. Layout and tie-in to building grounding system of copper grounding strips.

F. Test Reports:

1. Abrasion resistance: Depth of wear for each tile type and color and volume loss of tile, certified by independent laboratory. Tested per ASTM F510/F510M.

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 are not acceptable.

1.5 STORAGE:

- A. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives, and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.6 QUALITY ASSURANCE:

- A. Installer Qualifications: A company specializing in installation with minimum three (3) years' experience and employs experienced flooring installers who have installed a minimum of 500 sf of static dissipative resilient flooring.

1.7 WARRANTY:

- A. Construction Warranty: Comply with FAR clause 52.246-21, "Warranty of Construction".

1.8 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. ASTM International (ASTM):
 - D2047-11Test Method for Static Coefficient of Friction
of Polish-Coated Flooring Surfaces as Measured
by the James Machine
 - D2240-05 (R2010)Test Method for Rubber Property—Durometer
Hardness
 - D4078-02 (R2008)Water Emulsion Floor Finish

E648-14cCritical Radiant Flux of Floor Covering Systems
Using a Radiant Energy Source
E662-14Specific Optical Density of Smoke Generated by
Solid Materials
E1155/E1155M-14Determining Floor Flatness and Floor Levelness
Numbers
F510/F510M-14Resistance to Abrasion of Resilient Floor
Coverings Using an Abrader with a Grit Feed
Method
F710-11Preparing Concrete Floors to Receive Resilient
Flooring
F925-13Test Method for Resistance to Chemicals of
Resilient Flooring
F1344-12 (R2013)Rubber Floor Tile
F1700-13aSolid Vinyl Floor Tile
F1869-11Test Method for Measuring Moisture Vapor
Emission Rate of Concrete Subfloor Using
Anhydrous Calcium Chloride
F2170-11Test Method for Determining Relative Humidity
in Concrete Floor Slabs Using in Situ Probes
F2195-13Linoleum Floor Tile

C. ANSI/ESD Standards

1. ANSI/ESD STM 7.1 :Floor Materials–Resistive Characterization
of Materials
2. ANSI/ESD STM 97.1: Floor Materials and Footwear–Resistance in
Combination with a Person
3. ANSI/ESD STM 97.2: Floor Materials and Footwear Voltage
Measurement in Combination with a Person

D. Code of Federal Regulation (CFR):

40 CFR 59Determination of Volatile Matter Content, Water
Content, Density Volume Solids, and Weight
Solids of Surface Coating

E. International Standards and Training Alliance (INSTALL):

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Provide adhesives, underlayment, primers, and polish recommended by resilient floor material manufacturer.
- B. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.
- C. Smoke Density: Less than 450 per ASTM E662.
- D. Slip Resistance - Not less than 0.5 when tested with ASTM D2047.
- E. Provide flooring material to meet the following electrical properties when installed according to manufacturer's instructions with the required adhesive, copper strips and SDT floor finish:
 - 1. ANSI/ESD STM 7.1 Floor Materials-Resistive Characterization of Materials results between 10^6 and 10^9 ohms, point-to-point and point-to-ground.
 - 2. ASTM F 150 Electrical Resistance of Flooring between 10^6 and 10^9 ohms, point-to-point and point-to-ground.
 - 3. ANSI/ESD STM 97.1: Floor Materials and Footwear-Resistance in Combination with a Person results between 10^6 and 10^9 ohms (average) with dissipative footwear and when using heel straps.
 - 4. ANSI/ESD STM 97.2: Floor Materials and Footwear Voltage Measurement in Combination with a Person - 30 volts (average) with dissipative footwear at 12% relative humidity.
 - 5. Static Dissipation @ 12% RH: Flooring in combination with a person wearing dissipative footwear - 1000 to 100 volts: 0.2 seconds maximum.

2.2 LEVELING COMPOUND FOR CONCRETE FLOORS:

- A. Provide cementitious products with latex or polyvinyl acetate resins in the mix in accordance with Section 09 05 16.

2.3 ADHESIVES

- A. Provide tile manufacturer's Static Dissipative Tile Adhesive with 2 in. (5.08 cm) wide x 24 in. (60.96 cm) long copper ground-connection strips for under the tile and Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.

2.4 POLISH AND CLEANERS:

- A. Provide Static Dissipative Tile manufacture's recommended adhesive and polish for application as initial and on-going static dissipative maintenance finish.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS:

- A. Maintain flooring materials and areas to receive resilient flooring at a temperature above 20 degrees C (68 degrees F) for three (3) days before application, during application and two (2) days after application, unless otherwise directly by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 13 degrees C (55 degrees F) thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

3.2 INSTALLATION:

- A. Install in accordance with manufacturer's instructions for application and installation unless specified otherwise.
- B. Mix tile from at least two containers. An apparent line either of shades or pattern variance is not acceptable.
- C. Tile Layout:
 - 1. Lay tile symmetrically about center of room or space with joints aligned.
 - 2. Vary edge width as necessary to maintain full size tiles in the field, no edge tile to be less than 1/2 the field tile size, except where irregular shaped rooms make it impossible.
 - 3. Place tile pattern in the same direction; do not alternate tiles.
- D. Application:
 - 1. Adhere floor tile to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
 - 2. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

3. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
4. Roll tile floor with a minimum 45 kg (100 pound) roller.
- E. Seal joints at pipes with sealants in accordance with Section 07 92 00, JOINT SEALANTS.
- F. Installation of Edge Strips:
 1. Locate edge strips under center line of doors.
 2. Set resilient edge strips in adhesive.
 3. Where tile edge is exposed, butt edge strip to touch along tile edge.

3.3 CLEANING AND PROTECTION:

- A. Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.
- B. Keep traffic off resilient material for a minimum 72 hours after installation.
- C. Clean flooring as recommended in accordance with manufacturer's printed maintenance instructions and within the recommended time frame. As required by the manufacturer, apply the recommended number of coats and type of polish and/or finish in accordance with manufacturer's written instructions.
- D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by COR. At entrances and where wheeled vehicles or carts are used, cover tile with plywood, hardboard, or particle board over paper, secured and maintained until removal is directed by COR.
- E. When protective materials are removed and immediately prior to acceptance, replace damaged tile and mouldings, re-clean resilient materials.

- - - E N D - - -

SECTION 09 69 00
ACCESS FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Access flooring is to consist of a series of modular, removable, interchangeable panels on an elevated support system forming an accessible underfloor cavity to accommodate electrical and mechanical services. System is to be bolted filled formed or cast panels on stringerless understructure.
- B. Work of this section includes, but is not limited to: access floor panels, floor coverings, understructure and various electrical, data and communication accessories.
- C. The replacement of the existing access flooring system shall be done in segments as part of maintaining the data center in full operation 24/7/365.
Existing server and equipment racks shall be temporally supported in their existing locations where indicated on the drawings.
- D. Access flooring contractor shall have documented past experience with the replacement of access flooring in a minimum of five (5) live data center.

1.2 RELATED WORK

- A. Section 01 81 11, SUSTAINABLE CONSTRUCTION REQUIREMENTS: Sustainable Design Requirements.
- B. Section 09 06 00, SCHEDULE FOR FINISHES: Color and Texture of Finishes.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Connection of access flooring systems to building ground.
- D. Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
- E. Electrical distribution components: Refer to applicable construction documents.
- F. See Division 26 Section "Grounding and Bonding for Electrical Systems" for connection to ground of access flooring understructure. A licensed electrical contractor shall provide the necessary labor and materials to electrically connect the access flooring to the building ground.

1.3 APPLICABLE PUBLICATIONS:

- A. The Publications listed below (including amendments, addenda revisions, supplements and errata) form a part of this specification to the extent

referenced. The publications are referenced in text by basic designation only.

B. American Concrete Institute (ACI):

355.2-19Qualification for Post-Installed Mechanical
Anchors in Concrete and Commentary

C. American Institute of Steel Construction (AISC):

Load and Resistance Factor Design, Volume 1, Second Edition

D. ASTM International (ASTM):

A36/A36M-19Standard Specification for Carbon Structural
Steel

A53/A53M-18Standard Specification for Pipe, Steel, Black
and Hot-Dipped, Zinc-Coated, Welded and
Seamless

A307-14e1Standard Specifications for Carbon Steel Bolts,
Studs, and Threaded Rod 60,000 PSI Tensile
Strength

A325-14Standard Specification for Structural Bolts,
Steel, Heat Treated, 120/105 ksi Minimum
Tensile Strength

A325M-14Standard Specification for High-Strength Bolts
for Structural Steel Joints [Metric]

A490-14aStandard Specification for Heat-Treated Steel
Structural Bolts, 150 ksi Minimum Tensile
Strength

A490M-14aStandard Specification for High-Strength Steel
Bolts, Classes 10.9 and 10.9.3, for Structural
Steel Joints [Metric]

A500/A500M-18Standard Specification for Cold-Formed Welded
and Seamless Carbon Steel Structural Tubing in
Rounds and Shapes

A501/A501M-14Standard Specification for Hot-Formed Welded
and Seamless Carbon Steel Structural Tubing

A615/A615M-20Standard Specification for Deformed and Plain
Carbon Steel Bars for Concrete Reinforcement

A992/A992M-11(2015)Standard Specification for Steel for Structural
Shapes for Use in Building Framing

A996/A996M-16Standard Specification for Rail Steel and Axle
Steel Deformed Bars for Concrete Reinforcement
E488/E488M-18Standard Test Methods for Strength of Anchors
in Concrete Elements

E. American Society of Civil Engineers

1. Minimum Design Loads and Associated Criteria for Buildings and Other
Structures (ASCE 7) Edition as indicated in section 1.1 B of this
specification. Associated Criteria for Buildings and Other
Structures (ASCE 7): 7-16

F. International Building Code (IBC) Edition as indicated in Section 1.1 B
of this specification.

G. VA Handbook H18-8 Seismic Design Requirements, VA H-18-8, November
2019 (REVISED MAY 1, 2020)

H. National Uniform Seismic Installation Guidelines (NUSIG)

I. Sheet Metal and Air Conditioning Contractors National Association

J. (SMACNA): Seismic Restraint Manual - Guidelines for Mechanical Systems,
3RD EDITION 2008 and Addendum

K. CISCA (Ceilings & Interior Systems Construction Association) -
"Recommended Test Procedures for Access Floors" shall be used as
a guideline when presenting load performance product information.

1.4 Performance Certification

A. Product tests shall be witnessed and certified by independent
engineering and testing laboratory based in the U.S. with a
minimum of five years experience testing access floor
components in accordance CISCA "Recommended Test Procedures
for Access Floors".

1.5 DESIGN CRITERIA

A. Access floor system, where indicated on the design documents, shall
consist of modular and removable fully encased cementitious filled
welded steel panels supported on all four edges by structural steel
members which are designed to bolt onto adjustable height pedestal
assemblies forming a modular grid pattern.

B. Panel shall be easily removed by one person with a suction cup lifting
device and shall be interchangeable except where cut for special
conditions.

C. Quantities, finished floor heights (FFH) and location of accessories
shall be as specified on the contract drawings.

D. Access floor materials shall comply with the provisions outlined

in FAR Subpart 25.2 - Buy American Act - Construction Materials.

- E. Floor panels shall be permanently marked with manufacturer's name, product identification, manufacturing date and country-of-origin. Removable Product ID stickers are not acceptable.
- F. Structural Performance per Cisca A/F: Provide access flooring systems capable of withstanding the following loads and stresses within limits and under conditions indicated, as determined by testing manufacturer's current standard products according to referenced procedures in Cisca:
- a. Ultimate-Load Performance: Provide access flooring systems capable of withstanding a minimum ultimate concentrated load equal to value obtained by multiplying specified concentrated floor panel design load by a factor of 2.5, without failing, according to Cisca A/F, Section II, "Ultimate Loading." Failure is defined as the point at which access flooring system will not take any additional load.
 - b. Rolling-Load Performance: Provide access flooring systems capable of withstanding rolling loads of the following magnitude applied to non-perforated panels, with a combination of local and overall deformation not to exceed 1.02 mm (0.040 inch) after exposure to rolling load over Cisca A/F Path A or B, whichever path produces the greatest top-surface deformation, according to Cisca A/F, Section III, "Rolling Loads."
 - c. Concentrated-Load Performance: Provide floor panels, including those with cutouts, capable of withstanding a concentrated design load of the following magnitude, with a top-surface deflection under load and a permanent set not to exceed, respectively, 2.03 and 0.25 mm (0.080 inch and 0.010 inch), according to Cisca A/F, Section I, "Concentrated Loads."
- G. Floor Flatness and assembly criteria: Installed access floor is to be level within plus or minus 1.59 mm in 3.05 m (1/16 inch in 10 feet), and plus or minus 3.18 mm (1/8 inch) over the entire area. Floor assembly to be rigid, free of vibration, rocking panels, rattles and squeaks.

- H. Leakage: Air leakage through the joints between panels and around the perimeter of the floor system not to exceed .057 cubic meters (2 cubic feet) of air per minute per linear 305 mm (1 foot) of joint subjected to 125 Pa (0.5 inch, water gauge) positive pressure in the plenum.
- I. Grounding: Components to be in direct positive contact for safe continuous electrical grounding of the entire floor system.
 - 1. Panel to Understructure Resistance: Not more than 10 ohms.
- J. Static Electricity Control: The acceptable resistance range is from not less than 0.5 mega ohms minimum to not more than 20,000 mega ohms maximum. Maximum electrical resistance is to be measured from the top of the panel to the grounded subfloor. Exposed metal will not be allowed at the wearing surface of the floor.
- K. Flame Spread Rating: Provide assembly flame spread of 25 or less using ASTM E84 test method.
 - a. Provide seismic restraint in accordance with the requirements of the drawings, VA Handbook H18-8: Seismic Design Requirements (<https://www.cfm.va.gov/til/etc/seismic.pdf>) and this specification in order to maintain the integrity of computer access flooring structural system so that they remain safe and functional in case of seismic event.
 - 2. The design of seismic restraints of computer access flooring to resist seismic load shall be based on Seismic Design parameters indicated below in accordance with VA H-18-8 in conjunction with ASCE 7-16 Specific requirements for Critical and Essential facilities are covered in Section 4.0 of H-18-8, including applying $I_p = 1.5$ for the computer access flooring.
 - a. International Building Code 2018 Edition
 - b. American Society of Civil Engineers Seismic Evaluation and Retrofit of Existing Buildings ASCE 41-17.
 - c. American Society of Civil Engineers Minimum Design Loads and Associated Criteria for Buildings and Other Structures ASCE 7-16
 - d. Facility Occupancy Category per VA H-18-8: Critical
 - e. Seismic Factors as follows:
 - 1. $SS=0.043$ MCER ground motion (period=0.2s)

2. S1=0.024 MCER ground motion (period=1.0s)
3. SMS=0.069 Site-modified spectral acceleration value
4. SM1=0.057 Site-modified spectral acceleration value
5. SDS=0.046 Numeric seismic design value at 0.2s SA
6. SD1=0.038 Numeric seismic design value at 1.0s SA
7. Seismic Design Category "A"
8. Fa=1.6 Site amplification factor at 0.2s
9. Fv=2.4 Site amplification factor at 1.0s
10. CRS=0.94 Coefficient of risk (0.2s)
11. CR1=0.896 Coefficient of risk (1.0s)
12. PGA=0.02 MCEG peak ground acceleration
13. F PGA=1.6 Site amplification factor at PGA
14. PGAM=0.032 Site modified peak ground acceleration
15. TL=12 Long-period transition period (s)
16. SsRT=0.043 Probabilistic risk-targeted ground motion (0.2s)
17. SsUH=0.046 Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
18. SsD=1.5 Factored deterministic acceleration value (0.2s)
19. S1RT=0.024 Probabilistic risk-targeted ground motion (1.0s)
20. S1UH=0.026 Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
21. S1D=0.6 Factored deterministic acceleration value (1.0s)
22. PGAd=0.5 Factored deterministic acceleration value (PGA)
23. Site Class: D
24. Building Risk Category: III

25. Component Importance Factor(Ip): 1.5

1.6 QUALITY CONTROL:

A. Shop-Drawing Preparation:

1. Computer Access Flooring seismic restraint systems shop drawings and delegated design calculations shall be prepared by a professional structural engineer with a minimum of 5 years' experience in the design and detailing of seismic force restraints. The professional structural engineer shall be registered by any board in the United States and submit qualifications with list of projects illustrating compliance with the experience requirement of this section.
2. Submit design tables and information used for the design-force levels, stamped and signed by a professional structural engineer registered in any state in the United States.

B. Coordination:

1. Do not install seismic restraints until seismic restraint submittals are approved by the Contracting Officers Representative (COR).
2. Coordinate installation of bracing with new, temporary, and existing equipment.

C. Seismic Certification:

This bracing requires Special Seismic Certification in accordance with requirements of section 13.2.2 of ASCE 7, including those required in existing buildings within Section 13.7.1.3.3, 13.7.7.3.3 and 13.7.8.3.3 of ASCE 41. The computer access floor is not to be considered inherently rugged as listed in Section 4.2.2 of VA H18-8, and shall comply with section 13.2.6 of ASCE 7.

1.7 Performance Requirements

A. **Design Load:** Panel supported on actual understructure system shall be capable of supporting a point load of 1500 lbs. applied on a one square inch area at any location on the panel without experiencing permanent set in excess of 0.010 inches as defined by CISC. The loading method used to determine design (allowable) load shall be in conformance with CISC Concentrated Load test method but with panel tested on actual understructure instead of steel blocks.

B. **Safety Factor:** Panel supported on actual understructure system shall withstand a point load of no less than (2) two times its design load rating on a one square inch area anywhere on the panel without failure when tested in accordance with CISC A/F, Section 2, "Ultimate

Loading". Failure is defined as the point at which the system will no longer accept the load.

- C. **Ultimate Load:** Panel supported on actual understructure system shall be capable of supporting a point load of at least 3000 lbs. applied through a load indenter on a one square inch area at any location on the panel without failure (i.e. minimum safety factor of 2) when tested in accordance with CISC A/F, Section 2, "Ultimate Loading".
- D. **Rolling Load:** Panel supported on actual understructure system shall be able to withstand the following rolling loads at any location on the panel without developing a local and overall surface deformation greater than 0.040 inches when tested in accordance with CISC A/F Section 3, "Rolling Loads". Note: wheel 1 and wheel 2 tests shall be performed on two separate panels.
- E. **Impact Load:** Panel and supporting understructure (the system) shall be capable of supporting an impact load of 150 lbs. dropped from a height of 36 inches onto a one square inch area (using a round or square indenter) at any location on the panel when tested in accordance with CISC A/F, Section 8, "Drop Impact Load Test".
- F. **Panel Drop Test:** Panel shall be capable of being dropped face up onto to a concrete slab from a height of 36", after which it shall continue to meet all load performance requirements as previously defined.
- G. **Panel Cutout:** Panel with an 8.625" diameter interior cutout supported on actual understructure shall be capable withstanding an ultimate load of 2500 lbs. without failure without the use of additional supports.
- H. **Flammability:** System shall meet Class A Flame spread requirements for flame spread and smoke development. Tests shall be performed in accordance with ASTM-E84-1998, Standard Test Method for Surface Burning Characteristics for Building Materials.
- I. **Combustibility:** All components of the access floor system shall qualify as non-combustible by demonstrating compliance with requirements of ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 deg C.

- J. **Recycled Content:** Panel and understructure system shall be required to have a minimum post-consumer recycled content of 15% and a minimum total recycled content of 40%.
- K. **Axial Load:** Pedestal support assembly shall provide a 6000 lb. axial load without permanent deformation when tested in accordance with CISCA A/F, Section 5, "Pedestal Axial Load Test".
- L. **Overturning Moment:** Pedestal support assembly shall provide an average overturning moment of 1000 in-lbs. when glued to a clean, sound, uncoated concrete surface when tested in accordance with CISCA A/F, Section 6, "Pedestal Overturning Moment Test".
- M. **Stringer Concentrated Load:** Stringer shall be capable of withstanding a concentrated load of 450 lbs. placed in its midspan on a one square inch area using a round or square indenter without exceeding a permanent set of 0.010" after the load is removed when tested in accordance with CISCA A/F, Section 4, "Stringer Load Testing".

1.7 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Samples: Full sized floor panel and each understructure component.
- D. Shop Drawings:
 - 1. Floor panel layout, including railing, step and ramp location.
 - 2. Detail components of assembly, anchoring methods and edge details, including cut-out details, method of grounding.
- E. Manufacturer's Literature and Data: Access floor.
- F. Manufacturer's Certificates: Flame spread rating.
- G. Floor System Test Reports: Submit certified test reports, from a testing laboratory satisfactory to the COR, attesting that the floor system proposed for installation meets all specified requirements. Submit test reports with shop drawings.
- H. Manufacturer's Qualifications.
- I. Installer's Qualifications.
- J. Seismic Calculations.

- A. Submit a complete and coordinated set of bracing and signed and sealed anchorage drawings and calculations for all computer access flooring elements requiring seismic restraint by the delegated professional structural engineer for review prior to installation including:
1. Description, layout, and location of all items to be anchored or braced with anchorage or brace points noted and dimensioned.
 2. Details of all anchorage and bracing at large scale with all members, parts brackets shown, together with all connections, bolts, welds etc. clearly identified and specified. Details shall be coordinated with all project conditions and trades prior to shop drawing submission for review.
 3. Complete calculations including but not limited to seismic design criteria, computer model input and output, seismic design forces and capacities, design tables and information used for all proprietary design elements such as post installed anchors, stamped and signed by a professional structural engineer
 4. For all post installed anchorages submit the appropriate International Code Council Engineering Service (ICC-ES) evaluation reports, California's Office of Statewide Health Planning and Development (OSHPD) pre-approvals, or lab test reports verifying compliance with OSHPD Interpretation of Regulations 28-6.
 5. Delegated professional structural engineer qualifications.
- B. Submit for review prior to installation, the following for seismic protection
1. Structural framing for the seismic and gravity support and the main superstructure for which the bracing and or anchorage is attached.
 2. Location of all gravity loads.
 3. Numerical value of gravity load reactions.
 4. Location of all seismic bracing.
 5. Numerical value of applied seismic brace loads.
 6. Type of connection (Vertical support, vertical support with seismic brace etc.).
 7. Seismic brace reaction type (tension or compression): Details illustrating all support and bracing components, methods of connections, and specific anchors to be used.
- C. Manufacturer's installation instructions and guidelines.

D. Manufacturer's Owner Manual outlining recommended care and maintenance procedures.

1.8 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer with three (3) years' experience in providing items of type specified.
- B. Installer's Qualifications: Installers who are trained and approved by manufacturer and have a minimum of three (3) years' experience installation of units required for this project.
- C. Obtain access flooring from single manufacturer.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 - 1. Deliver materials to site in undamaged condition, in original containers or packages, complete with accessories and instructions. Label packages with manufacturer's name and brand designations. Package materials covered by specific references bearing specification number, type, and class as applicable.
- B. Storage:
 - 1. Store all materials in original protective packaging in a safe, dry, and clean location. Store panels at temperatures between 4 and 32 degrees C (40 and 90 degrees F) and between 20 and 70 percent humidity. Replace defective or damaged materials.
- C. Handling:
 - 1. Handle and protect materials in a manner to prevent damage during the entire construction period.

1.10 WARRANTY

- A. Construction Warranty: Comply with FAR clause 52.246-21, "Warranty of Construction".

1.11 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 Association of Textile Chemists and Colorists (AATCC):
 - 134-11Electrostatic Propensity of Carpets
- C. Architectural Aluminum Manufacturers Association (AAMA):
 - 2604-10High Performance Organic Coatings on Aluminum Extrusions and Panels.
- D. ASTM International (ASTM):

- E84-20Surface Burning Characteristics of Building
Materials
- E648-19ae1Critical Radiant Flux of Floor-Covering Systems
Using a Radiant Heat Energy Source
- F150-06(2018)Electrical Resistance of Conductive and Static
Resilient Flooring
- F1066-04(2018)Vinyl Composition Floor Tile
- F1700-20Solid Vinyl Floor Tile
- E. Code of Federal Regulation (CFR):
- 40 CFR 59Determination of Volatile Matter Content, Water
Content, Density Volume Solids, and Weight
Solids of Surface Coating
- F. National Association of Architectural Metal Manufacturers (NAAMM):
- AMP 500 SeriesMetal Finishes Manual
- G. National Electrical Manufacturers Association (NEMA):
- LD-3.1-05Application, Fabrication, and Installation of
High-Pressure Decorative Laminates
- H. Ceilings and Interior Systems Construction Association (CISCA):
- CISCA 2004Recommended Test Procedures for Access Floors
- I. National Fire Protection Association (NFPA):
- 75-13Fire Protection of Information Technology
Equipment
- J. Underwriters Laboratory (UL):
- 94-06(R2014)Tests for Flammability of Plastic Materials for
Parts in Devices and Appliances

1.12 CUT-OUTS

- A. Fabricate cut-outs in floor panels to accommodate cable penetrations and service outlets where shown on construction documents or specified. Provide reinforcement or additional support to make panels with cut-outs perform the same as solid uncut panels. Fit cut-outs with manufacturer's standard grommet. For cut-outs larger than maximum size grommet, trim edge of cut-outs with plastic trim, molding and/or gaskets having tapered top flange. Provide removable twist close covers for grommets.
1. Provide foam-rubber pads for sealing annular space formed in cutouts by cables and trim edge of cutout with molding having flange and ledge for capturing and supporting pads.

- B. Prior to installation, subfloor is to be dry and free of any surface irregularities that will adversely affect access flooring system appearance or performance.
- C. Clear the area in which the floor system is to be installed of debris. Clean floor surfaces and remove dust before the work is started.

1.13 INSTALLATION

- A. Layout floor panel installation to keep the number of cut panels at the floor perimeter to a minimum and to sizes not less than 1/2 half width to the greatest extent possible. Scribe panel assemblies at perimeter and around column to provide a close fit with no voids greater than 6 mm (1/4 inch) where panels abut vertical surface.
- B. Secure bases of pedestals to the structural sub-base with mechanical fasteners in full and firm contact with the subbase. Set pedestals plumb, and in true alignment.
- C. Where pedestal stringer system is used, join the stringers and other framing members with threaded fasteners for positive connection to the pedestals to preclude lateral movement. Uniformly space stringers in parallel lines, and place at the indicated elevation.
- D. Provide auxiliary framing around columns and other permanent construction, at sides of ramps, at free ends of floor, and beneath floor panels that are substantially cut to accommodate utility systems.
- E. Construct floor panels to lie flat without warp or twist and bear uniformly on supports without rocking, and without edges projecting above the floor plane. Panels to interlock with supports in a manner that will preclude lateral movement.
- F. Provide free ends of floor with positive anchorage and rigid support where floor system does not abut wall or other construction.
- G. Cover exposed ends of floor system with aluminum closures. Closures to consist of complete trim and fascia assemblies.

1.14 REPAIR OF WELDED GALVANIZED SURFACES:

- A. Use galvanized repair compound where galvanized surfaces are scheduled to receive field or shop coatings, and apply in accordance with manufacturers printed instructions.

1.15 CLEANING

- A. Remove debris accumulated during installation from beneath the raised floor system. Immediately after completion of the floor installation, apply floor cleaner in accordance with the floor covering

manufacturer's instruction. Do not allow any cleaner to remain between individual panels.

1.16 PROTECTION

- A. Cover cleaned floors with clean building paper before construction traffic is permitted. Remove protective covering at completion of Work.

PART 2 - PRODUCTS

2.1 Manufacturers- Basis of Design

- A. Access floor system shall be as manufactured by Tate Access Floors, Inc. and shall consist of ConCore® 2500/3000 access floor panel supported by a bolted stringer understructure system.
- B. Or approved equal.

2.2 Support Components

Pedestals:

- A. Pedestal assemblies shall be corrosive resistant, all steel welded construction, and shall provide an adjustment range of +/- 1" for finished floor heights 6" or greater.
- B. Pedestal assemblies shall provide a means of leveling and locking the assembly at a selected height, which requires deliberate action to change height setting and prevents vibration displacement.
- C. Steel pedestal head shall be welded to a threaded rod which includes a specially designed adjusting nut. The nut shall provide location lugs to engage the pedestal base assembly, such that deliberate action is required to change the height setting.
- D. Threaded rod shall provide a specially designed anti-rotation device, such that when the head assembly is engaged in the base assembly, the head cannot freely rotate.
- E. Pedestal base assembly shall consist of a formed steel plate with no less than 16 inches of bearing area, welded to a 7/8" square steel tube and shall be designed to engage the head assembly.

2.3 Stringers:

- A. Stringers shall support each edge of panel.

- B. Steel stringers shall have conductive galvanized coating. Zinc electroplating shall be prohibited on stringers and stringer fasteners.
- C. Stringers shall be individually and rigidly fastened to the pedestal with one machine screw for each foot of stringer length. Bolts shall provide positive electrical contact between the stringers and pedestals. Connections depending on gravity or spring action are unacceptable.
- D. Stringer grid shall be 4 ft stringers in a basketweave configuration ensuring maximum lateral stability in all directions.

2.4 Panel Components

Floor Panels:

- A. Panels shall consist of a top steel sheet welded to a formed steel bottom pan filled internally with a lightweight cementitious material. Mechanical or adhesive methods for attachment of the steel top and bottom sheets are unacceptable.
- B. Floor panels shall be protected from corrosion by electro-deposited epoxy paint. The use of zinc electroplating shall be prohibited.
- C. Cementitious fill material shall be totally encased within the steel welded shell except where cut for special conditions. Note: This greatly reduces the potential for dust in the environment from exposed cement materials.

2.5 Accessories

- A. Provide manufacturer's standard steps, ramps, fascia plate, perimeter support, and grommets where indicated on the contract drawings.

Provide 10 spare floor panels type used in the project for maintenance stock. Deliver to project in manufacturer's standard packaging clearly marked with the contents.

- B. Provide two panel lifting devices.
- C. When applicable provide manufacturer's standard underfloor air systems components (including, grilles, diffusers and perforated floor panels) where indicated on the contract drawings.

2.6 FINISHES

A. Finish the surface of floor panels with resilient homogenous static dissipative vinyl tile.

1. Surface to Grounds RESISTANCE OF Static Dissipative Covering: Average test values shall be within the range of 1,000,000 ohms (1.0×10^6) to 20,000 megohms (2.0×10^{10} ohms), as determined by testing in accordance with the test method for conductive flooring specified in Chapter 3 of NFPA 99, but modified to place one electrode on the floor surface and to attach one electrode to the understructure. Resistance shall be tested at 500 volts.
2. Surface to Ground Resistance of Conductive Covering: Not less than 25,000 ohms (2.5×10^4), nor more than 1,000,000 ohms (1.0×10^6), as determined by testing in accordance with the test method for conductive flooring specified in Chapter 3 of NFPA 99, but modified to place one electrode on the floor surface and attach one electrode to the understructure. Resistance shall be tested at 500 volts.

2.7 Fabrication Tolerances

- | | |
|--|------------|
| A. Floor panel flatness measured on a diagonal: | +/- 0.035" |
| B. Floor panel flatness measured along edges: | +/- 0.025" |
| B. Floor panel width or length of required size: | +/- 0.010" |
| C. Floor panel squareness tolerance: | +/- 0.015" |

PART 3 - EXECUTION

3.1 Preparation

- A. Examine existing structural concrete subfloor for unevenness, irregularities and dampness that would affect the quality and execution of the work. Do not proceed with installation until structural floor surfaces are level, clean, and dry as completed by others.
- B. Verify that proposed adhesive achieves bond to existing slab before commencing work if the adhesive does not active bond grind off existing sealer.

- C. Verify dimensions on contract drawings, including level of interfaces including abutting floor, ledges and doorsills.
- D. Area to receive and store access floor materials shall be enclosed and maintained at ambient temperatures between 35° to 95° F and relative humidity levels between 20 to 80%. At least 24 hrs. before installation begins, all floor panels shall be stored at ambient temperatures between 50° to 90° F and relative humidity levels between 20% to 80% and shall remain within these environmental limits throughout occupancy.

3.2 **Installation**

- A. Pedestal locations shall be established from approved shop drawings so that mechanical and electrical and fire suppression work can be installed without interfering with pedestal installation.
- B. Installation of access floor shall be coordinated with other trades to maintain the integrity of the installed system, and to maintain the data center in full operation 24 hours per day, 7 days per week, 365 days per year. There shall be no shut down of any data systems. All traffic on access floor shall be controlled by access floor installer. No traffic but that of access floor installers shall be permitted on any finished floor area for 24 hours to allow the pedestal adhesive to set. Access floor panels shall not be removed by other trades for 72 hours after their installation.
- C. Floor system and accessories shall be installed under the supervision of the manufacturer's authorized representative and according to manufacturer's recommendations.
- D. No dust or debris producing operations by other trades shall be allowed in areas where access floor is being installed to ensure proper bonding of pedestals to subfloor.
- E. Access floor installer shall keep the subfloor broom clean and dust free as installation progresses.
- F. Partially complete floors shall be braced against shifting to maintain the integrity of the installed system at all times.

G. Additional pedestals as needed shall support panels where floor is disrupted by columns, walls, and cutouts.

H. Understructure shall be aligned such that all uncut panels are interchangeable and fit snugly but do not bind when placed in alternate positions.

I. Finished floor shall be level, not varying more than 0.062" in 10 feet or 0.125" overall.

J. Inspect system prior to application of floor covering and replace any floor panels that are cracked, broken and structurally damaged and do not comply with specified requirements.

3.3 SEISMIC ANCHORING REQUIREMENTS

A. Provide equipment supports and anchoring devices to withstand the seismic design forces, so that when seismic design forces are applied, the equipment cannot displace, overturn, or become inoperable.

B. Provide anchorages in conformance with recommendations of the equipment manufacturer and as shown on approved shop drawings and calculations.

C. Construct seismic restraints and anchorage to allow for thermal expansion.

D. Testing Before Final Inspection:

1. Test 10-percent of anchors in masonry and concrete per ASTM E488, and ACI 355.2 to determine that they meet the required load capacity. If any anchor fails to meet the required load, test the next 20 consecutive anchors, which are required to have zero failure, before resuming the 10-percent testing frequency.

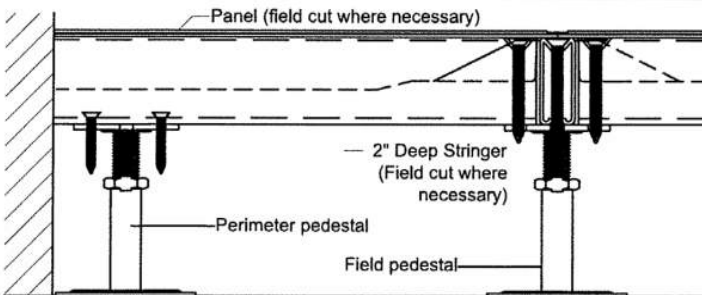
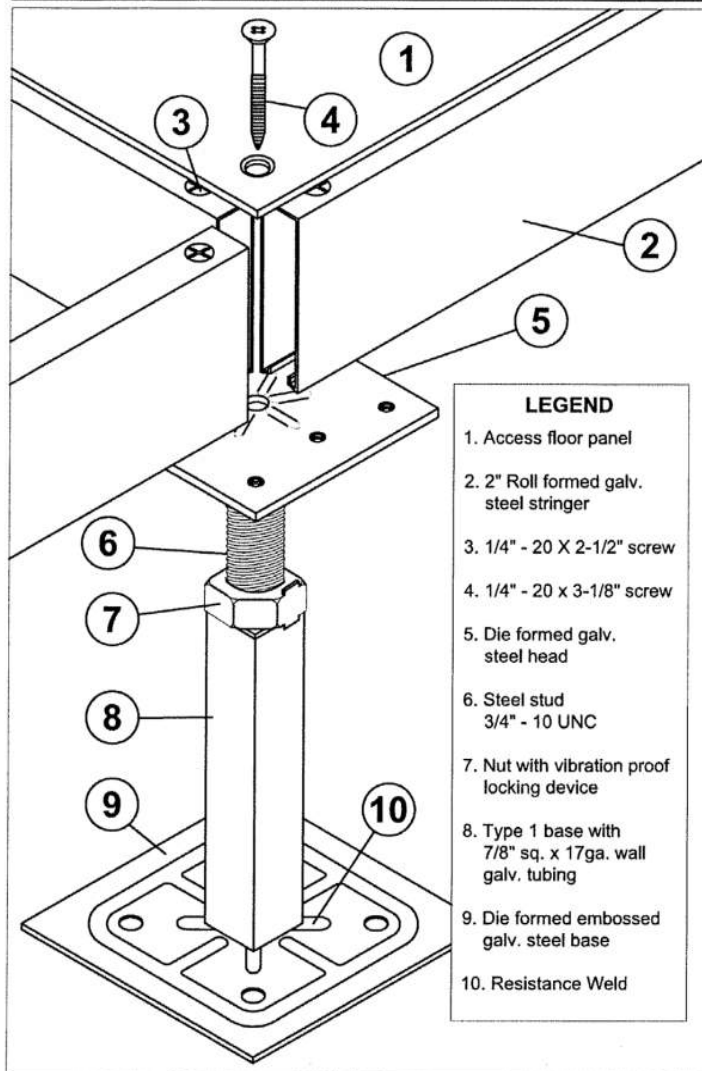
2. Before scheduling Final Inspection, submit a report on this testing indicating the number and location of testing, and what anchor-loads were obtained.

3. Construct seismic restraints and anchorages to not interfere with other trades or damage existing or in-situ elements of the constructed building.

- - - E N D - - -



Combination 2" Deep Bolted Stringer and Cornerlock Understructure for ConCore® 3000 Floor Panels-24". Type 1A



PEDESTAL SPECIFICATIONS

Pedestal Assembly

- Assembly up to 36" FFH shall provide a 6,000 lb. axial load without permanent deformation.
- Assembly shall provide a 2" total adjustment with a floor height of 8" or greater.
- Standard finished floor heights from 6" to 36". For other finished floor heights please contact the Tate Technical Hotline @ 800-231-7788. For seismic conditions, refer to seismic submittal details.
- Overturning moment of 1,000 in./lbs. when Tate recommended pedestal adhesive is utilized.
- All pedestal components and fasteners are completely electro-zinc free.

Pedestal Head

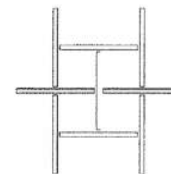
- 8 ga. die formed galvanized steel pedestal head with fillet welded stud with adjustment nut. Head and installed stringers shall provide full perimeter edge support for panel.
- Stringers shall be attached with 1/4" - 20 flat-head screws.
- Pedestal head shall be tapped for engagement of stringer screws.
- Steel stud shall be 3/4" - 10 UNC.
- Nut shall be 3/4" - 10 UNC with corrosion resistant coating.
- Cornerlock fastener shall be 1/4" - 20 flat-head machine screw.
- Stud shall provide an anti rotation feature when engaged with the pedestal base assembly (8" FFH or higher).

Pedestal Base

- Base to be at least 16" square and galvanized steel with (4) 1/4" diameter holes for mechanical fastening applications.
- Pedestal tube shall be 7/8" x 17 ga. wall square galvanized tubing.

Stringers

- Heavy duty roll formed steel stringer shall be 2" deep X 3/4" wide and shall withstand 1250 lb. mid-span load.
- Galvannealed stringer construction to prevent corrosion. Zinc electroplating is prohibited.
- Stringer grid pattern shall be 4' by 4' basketweave.



Perimeter

- Perimeter pedestal shall provide support for panels around columns, at walls, curbs and fascia.

Tate Access Floors, Inc.
7510 Montevideo Road
Jessup, MD 20794
Tel (410) 799-4200 Fax (410) 799-4207

© 2010 Tate Access Floors, Inc.
Rev 7/2015

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

SECTION 09 91 00
PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the construction documents and/or specified herein, including, but not limited to, the following:
1. Prime coats which may be applied in shop under other sections.
 2. Prime painting unprimed surfaces to be painted under this Section.
 3. Painting items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.
 4. Painting ferrous metal (except stainless steel) exposed to view.
 5. Painting galvanized ferrous metals exposed to view.
 6. Painting interior concrete block exposed to view.
 7. Painting gypsum drywall exposed to view.
 8. Painting of wood exposed to view, except items which are specified to be painted or finished under other Sections of these specifications. Back painting of all wood in contact with concrete, masonry or other moisture areas.
 9. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports, and other mechanical and electrical items and equipment exposed to view.
 10. Painting surfaces above, behind, or below grilles, gratings, diffusers, louvers, lighting fixtures, and the like, which are exposed to view through these items.
 11. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.
 12. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
 13. Painting of any surface not specifically mentioned to be painted herein or on construction documents, but for which painting is obviously necessary to complete the job, or work

which comes within the intent of these specifications, is to be included as though specified.

1.2 RELATED WORK

- A. Division 21 - FIRE SUPPRESSION.
- B. Division 22 - PLUMBING.
- C. Division 23 - HEATING, VENTILATION AND AIR-CONDITIONING.
- D. Division 26 - ELECTRICAL.
- E. Division 27 - COMMUNICATIONS.
- F. Division 32 - SITEWORK.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Painter qualifications.
- D. Manufacturer's Literature and Data:
 - 1. Before work is started, or sample panels are prepared, submit manufacturer's literature and technical data, 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 (1) 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.
- E. Sample Panels:
 - 1. After painters' materials have been approved and before work is started submit sample panels showing each type of finish and color specified.
 - 2. Panels to Show Color: Composition board, 100 x 250 mm (4 x 10 inch).
 - 3. Panel to Show Transparent Finishes: Wood of same species and grain pattern as wood approved for use, 100 x 250 mm (4 x 10

inch face) minimum, and where both flat and edge grain will be exposed, 250 mm (10 inches) long by sufficient size, 50 x 50 mm (2 x 2 inch) minimum or actual wood member to show complete finish.

4. Attach labels to panel stating the following:

- a. Federal Specification Number or manufacturers name and product number of paints used.
- b. Specification code number specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- c. Product type and color.
- d. Name of project.
- e. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.

F. Sample of identity markers if used.

G. Manufacturers' Certificates indicating compliance with specified requirements:

1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.
2. High temperature aluminum paint.
3. Epoxy coating.
4. Intumescent clear coating or fire retardant paint.
5. Plastic floor coating.

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. Specify Coat Types: Prime; body; finish; etc.
- C. Maintain space for storage, and handling of painting materials and equipment in a ventilated, 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 7 and 30 degrees C (45 and 85 degrees F).

1.5 QUALITY ASSURANCE

- A. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces. Submit evidence that key personnel have successfully performed surface preparation and application of coating on a minimum of three (3) similar projects within the past three (3) years.
- B. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Contracting Officer Representative (COR) in writing of any anticipated problems using the coating systems as specified with substrates primed by others.

1.6 REGULATORY REQUIREMENTS

- A. Paint materials are to conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
1. Volatile Organic Compounds (VOC) Emissions Requirements: Field-applied paints and coatings that are inside the waterproofing system to not exceed limits of authorities having jurisdiction.
 2. Lead-Base Paint:
 - a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
 - b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures

are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.

- c. Do not use coatings having a lead content over 0.06 percent by weight of non-volatile content.
- d. For lead-paint removal, see Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
- e. Asbestos: Provide materials that do not contain asbestos.
- f. Chromate, Cadmium, Mercury, and Silica: Provide materials that do not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
- g. Human Carcinogens: Provide materials that do not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
- h. Use high performance acrylic paints in place of alkyd paints.

1.7 SAFETY AND HEALTH

- A. Apply paint materials using safety methods and equipment in accordance with the following:
 - 1. Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis (AHA) as specified in Section 01 35 26, SAFETY REQUIREMENTS. The AHA is to include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.
- B. Safety Methods Used During Paint Application: Comply with the requirements of SSPC PA Guide 10.
- C. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:
 - 1. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.
 - 2. 29 CFR 1910.1000.
 - 3. ACHIH-BKLT and ACGHI-DOC, threshold limit values.

1.8 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

- B. American Conference of Governmental Industrial Hygienists (ACGIH):
 - 1. ACGIH TLV-BKLT-2012 Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
 - 2. ACGIH TLV-DOC-2012 Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)
- C. ASME International (ASME):
 - 1. A13.1-07(R2013) Scheme for the Identification of Piping Systems
- D. Code of Federal Regulation (CFR):
 - 1. 40 CFR 59 Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- E. E. Commercial Item Description (CID):
 - 1. A-A-1272A Plaster Gypsum (Spackling Compound)
- F. Federal Specifications (Fed Spec):
 - 1. TT-P-1411A Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)
- G. Master Painters Institute (MPI):
 - 1. Aluminum Paint
 - 2. Interior/ Exterior Latex Block Filler
 - 3. Exterior Alkyd Wood Primer
 - 4. Exterior Oil Wood Primer
 - 5. Exterior Alkyd, Flat MPI Gloss Level 1
 - 6. Exterior Alkyd Enamel MPI Gloss Level 6
 - 7. Exterior Latex, Flat
 - 8. Exterior Latex, Semi-Gloss
 - 9. Organic Zinc Rich Primer
 - 10. Aluminum Paint, High Heat (up to 590° - 1100F)
 - 11. Exterior / Interior Alkyd Floor Enamel, Gloss
 - 12. Polyurethane, Moisture Cured, Clear Gloss
 - 13. Knot Sealer

14. Interior Satin Latex, MPI Gloss Level 4
15. Interior Low Sheen Latex, MPI Gloss Level 2
16. Interior Primer Sealer
17. Interior Enamel Undercoat
18. Interior Alkyd, Semi-Gloss, MPI Gloss Level 5
19. Interior Alkyd, Gloss, MPI Gloss Level 6
20. Interior Latex Primer Sealer
21. Interior Alkyd, Eggshell, MPI Gloss Level 3
22. Interior Latex, MPI Gloss Level 3
23. Interior Latex, Flat, MPI Gloss Level 1
24. Interior Latex, Semi-Gloss, MPI Gloss Level 5
25. Interior/Exterior Alkyd Porch & Floor Enamel, Low Gloss
26. Interior/Exterior Latex Porch & Floor Paint, Low Gloss
27. Interior Alkyd Fire Retardant, Clear Top-Coat (ULC Approved)
28. Interior Latex Fire Retardant, Top-Coat (ULC Approved)
29. Interior/ Exterior Latex Porch & Floor Paint, Gloss
30. Polyurethane, Moisture Cured, Clear, Flat
31. Epoxy Cold Cured, Gloss
32. Marine Alkyd Metal Primer
33. Interior Wood Stain, Semi-Transparent
34. Wood Filler Paste
35. Exterior Alkyd, Semi-Gloss
36. Fast Drying Metal Primer
37. High Build Epoxy Coating
38. Epoxy Anti-Corrosive Metal Primer
39. High Build Epoxy Coating, Low Gloss
40. Interior Latex, Gloss
41. Exterior Latex, High Gloss (acrylic)
42. Galvanized Water Based Primer
43. Non-Cementitious Galvanized Primer

- 44. Interior High Performance Latex, MPI Gloss Level 2
- 45. Interior High Performance Latex, MPI Gloss Level 3
- 46. Interior High Performance Latex, MPI Gloss Level 4
- 47. Interior High Performance Latex (SG) MPI Gloss Level 5
- 48. Exterior Water Based Semi-Gloss Light Industrial Coating,
MPI Gloss Level 5

H. Society for Protective Coatings (SSPC):

- 1. SSPC SP 1-82(R2004) Solvent Cleaning
- 2. SSPC SP 2-82(R2004) Hand Tool Cleaning
- 3. SSPC SP 3-28(R2004) Power Tool Cleaning
- 4. SSPC SP 10/NACE No.2 Near-White Blast Cleaning
- 5. SSPC PA Guide 10 Guide to Safety and Health
Requirements

I. Maple Flooring Manufacturer's Association (MFMA):

J. U.S. National Archives and Records Administration (NARA):

- 1. 29 CFR 1910.1000 Air Contaminants

K. Underwriter's Laboratory (UL)

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

2.2 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.
- 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.
- C. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only to recommended limits.
- D. VOC Content: For field applications that are inside the weatherproofing system, paints and coating to comply with VOC

content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
 2. Non-flat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 5. Anticorrosive and Antirust Paints applied to Ferrous Metals: 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
- E. VOC test method for paints and coatings is to be in accordance with 40 CFR 59 (EPA Method 24). Part 60, Appendix A with the exempt compounds' content determined by Method 303 (Determination of Exempt Compounds) in the South Coast Air Quality Management District's (SCAQMD) "Laboratory Methods of Analysis for Enforcement Samples" manual.

2.3 FINISHES

- A. Paint color(s) and product(s) shall be as directed by COR and shall generally match existing finishes.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

**SECTION 10 14 00
SIGNAGE**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior signage for room numbers, and names.
- B. The signage shall match the existing signage system with the inclusion of braille tactile text line.

1.2 RELATED WORK

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Color and Finish of Interior Signs: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Provide signage that is the product of one manufacturer, who has provided signage as specified for a minimum of three (3) years. Submit manufacturer's qualifications.
- B. Installer's Qualifications: Minimum three (3) years' experience in the installation of signage of the type as specified in this Section. Submit installer's qualifications.
- C. Basis of Design: Signage manufacturer
2/90 Sign Systems
ATTN: Valerie Dye
Email: valeriedye@290signs.com
5350 Corporate Grove Blvd. SE
Grand Rapids, MI 49512
Tel: 800-777-4310 Ext. 3323
Fax: 616-656-4300
Or approved equal.
- D. New signs to match the existing signage system. See photograph included with the specification section.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.

- C. Interior Sign Sample: Sign panel and frame, with letters and room number and braille tactile text line.
 - 1. Sign Panel, 203 x 254 mm (8 x 10 inches), with letters.
 - 2. Color sample of matching existing signage color, 152 x 152 mm (6 x 6 inches).
- D. Manufacturer's Data:
 - 1. Showing the methods and procedures proposed for the anchorage of the signage system to each surface type.
 - 2. Manufacturer's printed specifications and maintenance instructions.
- E. Shop Drawings: Scaled for manufacture and fabrication of sign. Identify materials, anchorage, accessory items, mounting and finishes.
- F. Full size layout patterns for dimensional letters.
- G. Manufacturer's qualifications.
- H. Installer's qualifications.

1.5 DELIVERY AND STORAGE

- A. Deliver materials to job in manufacturer's original sealed containers with brand name marked thereon. Protect materials from damage.
- B. 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.
- C. Deliver signs only when the site and mounting services are ready for installation work to proceed.
- D. Store products in dry condition inside enclosed facilities.

1.6 WARRANTY

- A. Construction Warranty: Comply with FAR clause 52.246-21, "Warranty of Construction".

1.7 APPLICABLE PUBLICATIONS

- A. VA Signage Design Guide, December 2021
- B. VA Barrier Free Design Standard
- C. Federal Architectural Barriers Act Accessibility Standard (ABAAS)
- D. Code of Federal Regulation (CFR):
 - 40 CFR 59Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- E. Federal Specifications (Fed Spec):
 - MIL-PRF-8184FPlastic Sheet, Acrylic, Modified.
 - MIL-P-46144CPlastic Sheet, Polycarbonate

F. National Fire Protection Association (NFPA):

101-2021Life Safety Code

PART 2 - PRODUCTS

2.1 SIGNAGE GENERAL

- A. Provide signs of type, size and design shown on the construction documents.
- B. Provide signs complete with lettering, framing and related components for a complete installation.
- C. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.
- D. Do not scale construction documents for dimensions. Verify dimensions and coordinate with field conditions. Notify Contracting Officer Representative (COR) of discrepancies or changes needed to satisfy the requirements of the construction documents.

2.2 INTERIOR SIGN MATERIALS

- A. Door signage shall match room door signage provided as part of project 585-16-112 install server room.
- B. Provide component system signs with quarry blue finish.
- C. Signage
 - 1. Sign shall be made from a matching material that provides for letters, numbers and Braille to be integral with sign. Do not apply letters, numbers and Braille with adhesive.
 - 2. Numbers, letters and Braille to be raised 0.8 mm (1/32 inches) from the background surface. The draft of the letters, numbers and Braille to be tapered, vertical and clean.
 - 3. Braille Dots: Conform with ANSI A117.1 for Braille position and layout; (a) Dot base diameter: 1.5 mm (0.59 inches) (b) Inter-dot spacing: 2.3 mm (0.090 inches) (c) Horizontal separation between cells: 6.0 mm (.241 inches) (d) Vertical separation between cells: 10.0 mm (.395 inches)
- D. Fire Extinguisher Signs
 - 1. Three dimensional sign equal to Manufacture Prinzing Model No. V1FE15A, Fire Extinguisher sign, 6"x9", Red background with White

Letters and Graphics. Mount above fire extinguisher cabinet per fire department direction.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate signs as shown on the construction documents at each telecommunications room or other new or renovated spaces included in this project.
- B. Mount signs in proper alignment, level and plumb according to the construction documents and the dimensions given on elevation and Sign Location Plans. When exact position, angle, height or location is not clear, contact COR for resolution.
- C. At completion of sign installation, clean exposed sign surfaces. Clean and repair adjoining or adjacent surfaces that became soiled or damaged as a result of installation of signs.

- - - END - - -



-----THIS PAGE INTENTIONALLY LEFT BLANK-----

SECTION 10 44 13
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

This section covers semi-recessed fire extinguisher cabinets.

1.2 RELATED WORK

A. Any new wall construction and 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: Fire extinguisher cabinet including installation instruction and rough opening required.

1.4 APPLICATION 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 of Testing and Materials (ASTM):
D4802-15Poly (Methyl Methacrylate) Acrylic Plastic
Sheet

C. NFPA 10-2018 Standard for Portable Fire Extinguishers

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINET

Semi- recessed type with flat trim of size and design to match existing fire extinguisher cabinets.

2.2 FABRICATION

A. Form body of cabinet from 0.9 mm (0.0359 inch) thick sheet steel.

B. Fabricate door and trim from 1.2 mm (0.0478 inch) thick sheet steel with all face joints fully welded and ground smooth.

1. Glaze doors with 6 mm (1/4 inch) thick ASTM D4802, clear acrylic sheet, Category B-1, Finish 1.

2. Design doors to open 180 degrees.

3. Provide continuous hinge, pull handle, and adjustable roller catch.

2.3 FINISH

A. Finish interior of cabinet body with baked-on semigloss white enamel.

B. Finish door, frame with manufacturer's standard baked-on prime coat suitable for field painting.

PART 3 - EXECUTION

- A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.
- B. Install cabinet so that the handle of extinguisher height within is 40" AFF.
- C. BCVAMC will provide and install the fire extinguishers.

- - - E N D - - -

SECTION 13 05 41

SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Provide seismic restraint in accordance with the requirements of this section in order to maintain the integrity of nonstructural components of the building so that they remain safe and functional in case of seismic event.
- B. The design to resist seismic load shall be based on Seismic Design Categories per section 4.0 of the VA Seismic Design Requirements (H-18-8) dated November 1, 2019, <http://www.cfm.va.gov/til/etc/seismic.pdf>.
- C. Definitions: Non-structural building components are components or systems that are not part of the building's structural system whether inside or outside, above or below grade. Non-structural components of buildings include:
 - 1. Architectural Elements: nonbearing partitions, suspended ceilings, cabinets, bookshelves, medical equipment, and storage racks.
 - 2. Electrical Elements: Power systems, lighting systems, switchgear and switchboards, fire protection and alarm systems, special life support systems, and telephone and communication systems.
 - 3. Mechanical Elements: Heating, ventilating, and air-conditioning systems and plumbing systems.
 - 4. Fire Protection Elements: Sprinkler systems.

1.2 QUALITY CONTROL:

- A. Shop-Drawing Preparation:
 - 1. Have seismic-force-restraint shop drawings and calculations prepared by a professional structural engineer experienced in the area of seismic force restraints. The professional structural engineer shall be registered in the state where the project is located.
 - 2. Submit design tables and information used for the design-force levels, stamped and signed by a professional structural engineer registered in the State where project is located.
- B. Coordination:
 - 1. Do not install seismic restraints until seismic restraint submittals are approved by the COR.

2. Coordinate and install trapezes or other multi-pipe hanger systems prior to pipe installation.

1.3 SUBMITTALS:

- A. Submit a coordinated set of equipment anchorage drawings prior to installation including:
 1. Description, layout, and location of items to be anchored or braced with anchorage or brace points noted and dimensioned.
 2. Details of anchorage or bracing at large scale with all members, parts brackets shown, together with all connections, bolts, welds etc. clearly identified and specified.
 3. Numerical value of design seismic brace loads.
 4. For expansion bolts, include design load and capacity if different from those specified.
- B. Submit prior to installation, a coordinated set of bracing drawings for seismic protection of piping, with data identifying the various support-to-structure connections and seismic bracing structural connections, include:
 1. Single-line piping diagrams on a floor-by-floor basis. Show all suspended piping for a given floor on the same plain.
 2. Type of pipe (Copper, steel, cast iron, insulated, non-insulated, etc.).
 3. Pipe contents.
 4. Structural framing.
 5. Location of all gravity load pipe supports and spacing requirements.
 6. Numerical value of gravity load reactions.
 7. Location of all seismic bracing.
 8. Numerical value of applied seismic brace loads.
 9. Type of connection (Vertical support, vertical support with seismic brace etc.).
 10. Seismic brace reaction type (tension or compression):
Details illustrating all support and bracing components, methods of connections, and specific anchors to be used.
- C. Submit prior to installation, bracing drawings for seismic protection of suspended ductwork and suspended electrical and communication cables, include:

1. Details illustrating all support and bracing components, methods of connection, and specific anchors to be used.
 2. Numerical value of applied gravity and seismic loads and seismic loads acting on support and bracing components.
 3. Maximum spacing of hangers and bracing.
 4. Seal of registered structural engineer responsible for design.
- D. Submit design calculations prepared and sealed by the registered structural engineer specified above in paragraph 1.3A.
- E. Submit for concrete anchors, the appropriate ICBC evaluation reports, OSHPD pre-approvals, or lab test reports verifying compliance with OSHPD Interpretation of Regulations 28-6.

1.4 APPLICABLE PUBLICATIONS:

- A. The Publications listed below (including amendments, addenda revisions, supplements and errata) form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
1. 355.2-07 Qualification for Post-Installed Mechanical Anchors in Concrete and Commentary
- C. American Institute of Steel Construction (AISC):
1. Load and Resistance Factor Design, Volume 1, Second Edition
- D. American Society for Testing and Materials (ASTM):
1. A36/A36M-08 Standard Specification for Carbon Structural Steel
 2. A53/A53M-10 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 3. A307-10 Standard Specification for Carbon Steel Bolts and Studs; 60,000 PSI Tensile Strength.
 4. A325-10 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 5. A325M-09 Standard Specification for High-Strength Bolts for Structural Steel Joints [Metric]
 6. A490-10 Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
 7. A490M-10 Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints [Metric]

8. A500/A500M-10 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 9. A501-07 Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
 10. A615/A615M-09 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 11. A992/A992M-06 Standard Specification for Steel for Structural Shapes for Use in Building Framing
 12. A996/A996M-09 Standard Specification for Rail-Steel and Axel-Steel Deformed Bars for Concrete Reinforcement
 13. E488-96(R2003) Standard Test Method for Strength of Anchors in Concrete and Masonry Element
- E. American Society of Civil Engineers (ASCE 7) Latest Edition.
- F. National Fire Protection Association (NFPA):
1. 13-2019 Standard for the Installation of Sprinkler Systems.
- G. National Uniform Seismic Installation Guidelines (NUSIG)
- H. International Code Council (ICC):
1. IBC-2018 International Building Code
- I. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
1. Seismic Restraint Manual - Guidelines for Mechanical Systems, 1998 Edition and Addendum
- J. US Department of Veterans Affairs (VA):
1. H-18-8-2013 Seismic Design Requirements

1.5 REGULATORY REQUIREMENT:

- A. IBC Latest Edition.
- B. Exceptions: The seismic restraint of the following items may be omitted:
1. Equipment weighing less than 400 pounds, which is supported directly on the floor or roof.
 2. Equipment weighing less than 20 pounds, which is suspended from the roof or floor or hung from a wall.
 3. Medical piping less than 2-1/2 inches inside diameter.
 4. All other piping less than 2-1/2 inches inside diameter, except for automatic fire suppression systems.

5. All piping suspended by individual hangers, 12 inches or less in length from the top of pipe to the bottom of the support for the hanger.
 6. All electrical conduits, less than 2-1/2 inches inside diameter.
 7. All rectangular air handling ducts less than six square feet in cross sectional area.
 8. All round air handling ducts less than 28 inches in diameter.
 9. All ducts suspended by hangers 12 inches or less in length from the top of the duct to the bottom of support for the hanger.
- C. For fire sprinkler systems, refer to NFPA requirements and Division 21 specifications.

PART 2 - PRODUCTS

2.1 STEEL:

- A. Structural Steel: ASTM A36, A36M, or A992.
- B. Structural Tubing: ASTM A500, Grade B.
- C. Structural Tubing: ASTM A501.
- D. Steel Pipe: ASTM A53/A53M, Grade B.
- E. Bolts & Nuts: ASTM A307, A325, A325M, A490, or A490M.

PART 3 - EXECUTION

3.1 CONSTRUCTION, GENERAL:

- A. Provide equipment supports and anchoring devices to withstand the seismic design forces, so that when seismic design forces are applied, the equipment cannot displace, overturn, or become inoperable.
- B. Provide anchorages in conformance with recommendations of the equipment manufacturer and as shown on approved shop drawings and calculations.
- C. Construct seismic restraints and anchorage to allow for thermal expansion.
- D. Testing Before Final Inspection:
 1. Test 10-percent of anchors in masonry and concrete per ASTM E488, and ACI 355.2 to determine that they meet the required load capacity. If any anchor fails to meet the required load, test the next 20 consecutive anchors, which are

required to have zero failure, before resuming the 10-percent testing frequency.

2. Before scheduling Final Inspection, submit a report on this testing indicating the number and location of testing, and what anchor-loads were obtained.

3.2 EQUIPMENT RESTRAINT AND BRACING:

- A. See drawings for equipment to be restrained or braced.

3.3 MECHANICAL DUCTWORK AND PIPING, ELECTRICAL BUSWAYS, CONDUITS, AND CABLE TRAYS, AND TELECOMMUNICATION WIRES AND CABLE TRAYS

- A. Support and brace the following item(s) to resist directional forces (lateral, longitudinal and vertical).
 1. Mechanical ductwork and piping.
 2. Electrical busways, conduits, and cable trays.
 3. Telecommunications wires and cable trays.
- B. Provide supports and anchoring so that, upon application of seismic forces, piping remains fully connected as operable systems which will not displace sufficiently to damage adjacent or connecting equipment, or building members.
- C. Seismic Restraint of Piping:
 1. Design criteria:
 - a. Piping resiliently supported: Restrain to support 120-percent of the weight of the systems and components and contents.
 - b. Piping not resiliently supported: Restrain to support 60-percent of the weight of the system components and contents.
- D. Piping Connections: Provide flexible connections where pipes connect to equipment. Make the connections capable of accommodating relative differential movements between the pipe and equipment under conditions of earthquake shaking.

3.4 PARTITIONS

- A. In buildings with flexible structural frames, anchor partitions to only structural element, such as a floor slab, and separate such partition by a physical gap from all other structural elements.
- B. Properly anchor masonry walls to the structure for restraint, so as to carry lateral loads imposed due to earthquake along with their own weight and other lateral forces.

3.5 CEILINGS AND LIGHTING FIXTURES

- A. At regular intervals, laterally brace suspended ceilings against lateral and vertical movements, and provide with a physical separation at the walls.
- B. Independently support and laterally brace all lighting fixtures. Refer to applicable portion of lighting specification, Section 26 51 00, INTERIOR LIGHTING.

3.6 FACADES AND GLAZING

- A. Do not install concrete masonry unit filler walls in a manner that can restrain the lateral deflection of the building frame. Provide a gap with adequately sized resilient filler to separate the structural frame from the non-structural filler wall.
- B. Tie brick veneers to a separate wall that is independent of the steel frame as shown on construction drawings to ensure strength against applicable seismic forces at the project location.
- C. Install attachments to structure for all façade materials as shown on construction drawings to ensure strength against applicable seismic forces at the project location.

3.7 STORAGE RACKS, CABINETS, AND BOOKCASES

- A. Install storage racks to withstand earthquake forces and anchored to the floor or laterally braced from the top to the structural elements.
- B. Anchor medical supply cabinets to the floor or walls and equip them with properly engaged, lockable latches.
- C. Anchor filing cabinets that are more than 2 drawers high to the floor or walls, and equip all drawers with properly engaged, lockable latches.
- D. Anchor bookcases that are more than 30 inches high to the floor or walls, and equip any doors with properly engaged, lockable latches.

- - - E N D - - -

- - - THIS PAGE LEFT INTENTIONALLY BLANK - - -

---END OF VOLUME 1---