



EDWARD J. HINES, JR. VA HOSPITAL

RENOVATE PAS-EPC

VA 578-11-094

HINES, ILLINOIS

PROJECT MANUAL

VOLUME 1 OF 2

SPECIAL SECTIONS - DIVISION 00
GENERAL REQUIREMENTS - DIVISION 01
SPECIFICATION - DIVISIONS 02 THRU 19

November 22nd, 2013





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SECTION 00 01 15
LIST OF DRAWING SHEETS

The drawings listed below accompanying this specification form a part of
the contract.

<u>Drawing No.</u>	<u>Title</u>
As indicated on Drawing:	
1G-GI000	Index and Title Sheet
1G-GI001	Facility Management Approval Sheet (Pas-Epc)
1G-GI002	Abbreviations
1G-GI003	Symbols, Material Legend, Project Data, and General Notes
1G-GI004	Code Analysis - Section G
1G-GI005	Code Analysis - Section F
1G-AD101	Demolition Floor Plan & Reflected Ceiling Plan - Section G
1G-AD102	Demolition Floor Plan & Reflected Ceiling Plan - Section F
1G-AE101	Floor Plan and Reflected Ceiling Plan - Section G
1G-AE102	Floor Plan and Reflected Ceiling Plan - Section F
1G-AE300	Exterior Elevations & Building Sections (Window Replacement)
1G-AE600	Interior Elevations
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1G-AE800	Interior Partition Details
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1G-AE802	Details
1G-AE900	Door Schedule, Types and Details
1G-IN/F101	Finish and Furniture Plans - Section G
1G-IN/F102	Finish and Furniture Plans - Section F
1G-IQ101	Equipment Schedule
1G-IQ102	Equipment Schedule
1G-FX001	Legends, Abbreviations & General Notes
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1G-PL001	Plumbing Notes, Symbols and Abbreviations

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1G-EL101	Lighting Plan
1G-E201	Electrical Schedules
1G-E301	Electrical Details
1G-E302	Lighting Control Details
1G-E303	Electrical Equipment Schedule
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1G-T302	Technology Enlarged Room Plans
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1G-T401	Building 1 Section G, First Floor Technology Routing Conduit Plan
1G-T501	Building 1 Section G, First Floor Backbone Logic Diagrams

1G-T502	Building 1 Section G, First Floor Backbone Logic Diagrams
1G-T601	Building 1 Section G, First Floor Telecom Room G101-E & Equipment Plans & Elevations
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IG-101	Signage - Circulation Key
IG-200	Sign Type List
IN-01.02	Signage - Fire Equipment Plaque
IN-03.01	Signage - Room Sign

IN-09.03	Signage - Restroom
IN-10.01	Signage - Insert Holder
IN-13	Signage - Blade Sign
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PLB	Panel & Sugg'd Utility Location Plan_B
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ESHT2	Furniture Elevations_Sheet-2

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EDWARD J. HINES, JR. VA HOSPITAL
RENOVATE PAS-EPC
HINES, ILLINOIS

SECTION 00 03 00
AVAILABLE INFORMATION

1.1 SUMMARY

- A. Description: This Document defines available information documents which contain information related to the Work and defines responsibilities associated with using such documents.

1.2 GENERAL

- A. Relationship: Available information documents are not part of Contract Documents.
- B. Interpretation:
1. Available information documents are available only for information and convenience of bidders and Contractor, and are not intended as representative or warranties of such conditions.
 2. Conditions described in available information documents are based on information developed at a limited number of locations and observations. While adequate for purpose of respective available information document, actual conditions may differ from conditions indicated in respective available information document and information presented in respective available information document may not be adequate for purpose of bidders and Contractor.
- C. Disclaimer: Neither Owner nor Architect make any promise, representation, guarantee or warranty with respect to anything expressed or implied by available information documents, and disclaims any responsibility for correctness of such documents. Owner and Architect further disclaim responsibility for interpretations or conclusions drawn from available information documents, and make no further representation regarding conditions covered by such documents.
- D. Investigation: Bidders and Contractor are responsible to examine project site and to make their own investigations, inspections and tests at no cost to Owner, provided such operations are acceptable to Owner.
- E. Availability: Available information documents described in this Document, are not issued with Contract Documents, but are available for review by bidders and Contractor. Copies of available information documents are not available. Arrangements for review of available information documents shall be made with Contracting Officer's Technical Representative.

1.3 ENVIRONMENTAL ASSESSMENT DOCUMENTS

- A. General: Environmental assessments of project site were conducted, results which are to be found in environmental assessment documents are described in this Article.
- B. Hazardous Materials Building Survey: Limited Hazardous Materials Building Survey, Edward Hines V.A. Hospital, Building #1 Learning Center (Library Selected Areas), Hines, Illinois 60141; prepared for Epstein, 600 W. Fulton Street, Chicago, IL 60661; prepared by GSG Consultants, Inc., Suite 200, 855 West Adams Street, Chicago, Illinois 60607; telephone (312) 733-6262; Project Number I12-301.07; dated January 31, 2012, Roberto Rivera, Asbestos Inspector, and Panfilo Carrazco, Lead Inspector.

1.4 EXISTING CONSTRUCTION DOCUMENTS

- A. General: Previous development and construction of existing site, buildings and surrounding conditions at project site may be found in existing construction documents described in this Article.
- B. Existing Documents: VA has on file existing construction documents or construction record documents of existing and previous development and construction on project site.

1.5 SEPARATE CONTRACT DOCUMENTS

- A. General: Development and construction of other Project work under separate contracts which precedes, is concurrent with, overlaps or follows the Work of Contract may be found in documents of separate contracts.
- B. Aluminum Windows: Specification section for aluminum windows, as follows:
 - 1. Section 085116 - Aluminum Windows: Veterans Administration Hines, IL - Building 1; issued May 4, 2012; Project Number 2606-010-00 SD.

1.6 OWNER STANDARDS

- A. General: Owner provided design and construction standards may be found in documents described in this Article.
- B. Construction and Design Standards: VA has on file construction and design standards including but not limited to those specified in Section 01 41 00 - Regulatory Requirements, and the following:
 - 1. Hines VA Hospital Construction and Design Standards, dated September 30, 2008.
 - 2. OI&T Cabling Standards and Criteria, dated November 16, 2011.

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Hines VA Hospital Construction Design Standards

The Architect-Engineer (A/E) firm shall incorporate the following guidelines into the design package. A/E shall also fill up the attached Infection Control Risk Assessment (ICRA) and Pre-construction Risk Assessment (PCRA) forms and make them part of Specs in General Section 010000. A/E shall design the project according to the guidelines given in ICRA & PCRA. A/E shall customize the drawing sheets with this Project information and submit as part of 50% and 100% submittals.

1. All automatic door operators shall be 'Kean-Monroe' or approved equivalent. Ensure that the required 2-year warranty is part of the specifications. KM warranty is only one year, however, Automatic Door Inc. has warranted items for Hines VA Hospital for two years, per the VA Master Spec. The spec needs to read as two years because we do not know who we will have as a sub-contractor to the general contractor. Ensure the VA is named as the warranty holder and not the contractor.

2. Specify EPDM roofing systems in lieu of Ballast. High Albedo roofing systems are required. Roof material should have a solar reflectance no less than 0.70 (ASTM E-903) and infrared emittance of no less than 0.75 (ASTM E-408). In addition, roof insulation should conform to ASHRAE Std 90.1-2007 Section 5.5.3.1.

An exception to EPDM roofing is in situations with expected/frequent foot traffic, to consider EPDM alternatives due to high maintenance costs.

3. The lock cores we are using are: "Schlage Everest 7-pin Small Format Interchangeable Core". Our restricted keyway is "B145". The contractor can purchase these cores through Ewert Wholesale Hardware, 1-800-451-0200. Contractor shall provide temporary plugs to fill the core and allow lock function until the permanent lock cores is later installed by VA Locksmith. COTR can provide sole source justification letter.

4. Use Alarm Lock "T3" door locking hardware or approved equal where cipher/keypad entry is required.

5. Electrical conduit shall be a minimum of 3/4" diameter.

6. Floor tile: Avoid cutting tile less than half-size where possible. Past site experience has seen many rooms with tile less than 2" thick around the walls. The tile layout should be changed to avoid this. Keep in mind, you always can change the layout by 6" and still maintain symmetry.

7. Concrete shall not be used to fill floor/wall penetrations. UL-approved fire-patching materials are to specified in such situations.

8. Suspended ceiling systems: the contractor shall be required to install/hang wire, at or as close as possible, to the four corners of the fixture on the Grid Mains in conjunction with the Fixture Locking Clips. The locking clips lock the fixture into the grid mains and do not release unless unlocked.

The rationale for this is that if the shops ever have to work on the fixture or the space above it they will be able to access by releasing the clips. Left unchecked, any tasking on the fixtures would be very cumbersome

9. DISS connectors shall be used for all medical gas outlets.
10. All plumbing work shall be done in accordance with State & Federal codes.
11. For HVAC/R controls use “Johnson Control System” or Approved Equal.
12. Offsetting/relocation of common plumbing stacks shall not be designed into the project without prior approval from the VA Project Engineer
13. All sanitary drain lines shall be rodded to the main line prior to attaching new fixtures to the system.
14. Contractor shall install VA provided sharps disposal/containment boxes, soap dispensers (shower and sink use types), waterless hand sanitizer dispensers, paper towel dispensers, glove box dispensers, and toilet seat cover dispensers; locations to be identified through coordination with the VA Project Engineer.
15. Foot pedals for sinks shall be wall-mounted.
16. Accu Tech system or approved equal shall be used for wander security systems.
17. IRM data cable standards shall be used and provided by COTR. Data cable testing shall be conducted and the certification report submitted prior to the final inspection.
18. When renovating an entire floor in Building No. 200, make sure it has at least three fire extinguishers.
19. Include a requirement of attic stock for sprinkler heads.
20. Contractor shall install service valves at risers for hot and cold water lines and before zone valve for the medical gas system(s). This work is to enable isolation of the floor for future maintenance work.
21. All electrical distribution panels shall be labeled with its power source information (circuit feeding it).
22. Label the cover plates of all electrical receptacles both inside and outside with their circuit numbers (on the outside of the receptacle cover and a label inside the outlet box).
23. A/E shall provide and complete both the “*Infection Control Risk Assessment for Construction/Renovation Projects*” and “*Pre-Construction/Safety Risk Assessment*” forms and

include them into the specifications. The A/E shall prepare the bid documents to ensure the inclusion of the applicable infection control measures.

24. Replace all occurrences of “Resident Engineer” in this contract and throughout VA Master Specifications with “Project Engineer.” Project Engineer is a term synonymous with Contracting Officer’s Technical Representative (COTR).

25. Replace all occurrences of “Engineering Service” in this contract and throughout VA Master Specifications with “Project Planning Section, Facility Management Service”.

26. All fixtures to be checked for hot water 120° Fahrenheit at point of use. No run outs of greater than 50 feet without a hot water return line tie-in. This is a more stringent requirement than stated in the code which permits up to 100’.

28. Contractor shall use Energy Star rated materials and equipment.

29. Contractor shall use Premium Efficiency motors on all projects.

30. Toto Ecopower or equivalent high efficiency flush valves should be used in new toilet and urinal installations. Toilets and urinals must be rated for the low flows of the flush valve.

31. Lighting should be designed in accordance with Illuminating Engineering Society of North America (IESNA) recommendations and the New Buildings Institute “Advanced Lighting Guidelines,” specifically, 4’ fluorescent lamps shall be Super 32 T8 with High Efficiency multi-volt electronic ballast and Correlated Color Temperature (CCT) of 4100 °K.

32. HVAC equipment shall have minimum efficiencies in accordance with ASHRAE Standard 90.1-2007, Minimum Equipment Efficiency Tables 6.8.

33. Window/through-wall room type air conditioning units 20,000 BTU/Hr and less shall have an Energy Efficiency Ratio no less than 10.7.

34. Contract shall include statements regarding consideration of the contractor’s effect on the environment (NEPA issues) and also appropriate construction waste disposal (environment/GEMS).

OI&T Cabling Standards and Criteria

Last Revision: 11/16/2011

The Department of Veterans Affairs, Facilities Management Service, Project Planning, Contracting Officer's Technical Representative (hereinafter referred to as the "COTR"), and the Office of Information and Technology (hereinafter referred to as "OI&T") intends to upgrade the Information Transport Horizontal Data Cabling Infrastructure of its existing buildings located in the Hines VA Hospital, Hines, IL. The General Contractor, Cabling Contractor, or Certified Installer – as applicable to the contract (hereinafter referred to as the "Contractor") – shall be responsible for all parts, material, labor and all other associated apparatus necessary to completely install, test, certify and turn-over for acceptance to the OI&T/ COTR, the Information Transport Cabling Infrastructure detailed herein. Include and supply all necessary labor, material, tools and equipment for the proper construction and installation of information transport cabling in accordance with this document, accompanying drawings, and manufacturer's specifications. The OI&T/ COTR has a requirement to improve the horizontal data cabling infrastructure to enable 1Gbps throughput performance to its work areas. The existing voice cables and termination blocks will remain unchanged.

The Contractor will ensure that all projects will adhere to the following standards and criteria as defined by Hines' OI&T:

1. Voice/Data overview for Hines VAH

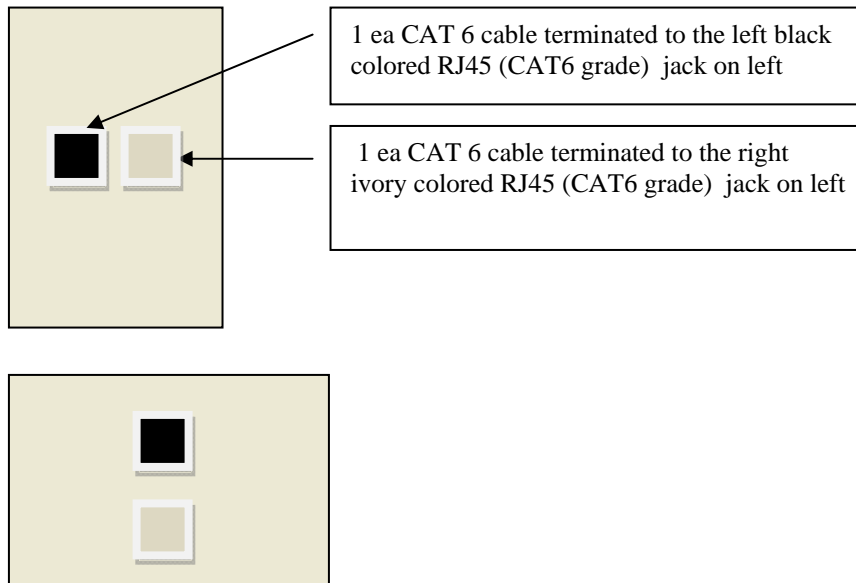
- A. The National Electrical Code (NEC) will be adhered to for all installations in addition to the any site specific requirements
- B. Materials and workmanship hereinafter specified and furnished shall be fully guaranteed by the Contractor for one year (365 calendar days) from transfer of title against any defects. In addition, defects which may occur as the result of faulty materials or workmanship within one year after installation and acceptance by the OI&T/ COTR shall be corrected by the Contractor at no additional cost to the OI&T/ COTR. The Contractor shall promptly, at no cost to the OI&T/ COTR, correct any nonconforming or defective work within one (1) year after completion of the project of which the work is a part. The period of the Cabling Contractor's warranty(ies) for any items herein are not exclusive remedies, and the OI&T/ COTR has recourse to any warranties of additional scope given by The Contractor to The OI&T/ COTR and all other remedies available at law or in equity. The Cabling Contractor's warranties shall commence with acceptance of/or payment for the work in full.

Given that the Contractor will be procuring equipment or materials under the Contract, the Contractor shall obtain for the benefit of the OI&T/ COTR a minimum of 20-year Structured Connectivity Solutions (SCS) warranty from the manufacturer, including all application assurance, labor & extended product warranties. The Contractor submit any additional warranties offered by the manufacturers, at no additional cost, to the OI&T/ COTR, should said warranties extend beyond the one-year period specified herein. This warranty shall in no manner cover equipment that has been damaged or rendered unserviceable due to negligence, misuse, acts of vandalism, or tampering by The OI&T/ COTR or anyone other than employees or agents of The Cabling Contractor. The Cabling Contractor's obligation under its warranty is limited to the cost of repair of the warranted item or replacement thereof, at The Cabling Contractor's option. Insurance covering installed equipment from damage or loss is to be borne by The Contractor until full acceptance of equipment and services.

OI&T Cabling Standards and Criteria

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- C. Contractor will coordinate activities through the COTR – as specified in contract documents – to meet with the OI&T staff to discuss their plans on conducting the actual work in and all Data or Voice operations prior to the start of the project. The purpose of this meeting is to identify any potential issues or constraints to the scope of work.
- D. Cable requirements:
- a. Copper
 - i. All **data drops** will use two white colored Category 6, four pair, 100 ohm UTP (24 AWG solid conductor), Systimax #.1071 1071004EWH or equivalent, unless otherwise specified. All materials shall be supplied by the contractor.
 - ii. All **voice drops** will use gray colored Category 5e, four pair, 100 ohm UTP (24 AWG solid conductor), unless otherwise specified. All materials shall be supplied by the contractor.
 - b. Fiber
 - i. When fiber optics is required the minimum pull shall be 12 strands of 50 micron multimode terminated at both ends with fiber connectors to be determined by OI&T representative. All materials shall be provided by the contractor, every installation shall be tested and identified with documentation provided to the VA representative
- E. Data **only** drops shall be in dual jack configurations as described below:
- a. Data legacy dual jack configuration, no phone:
 - i. Face plate shall be an ivory colored, dual faceplate
 - ii. Left side jack shall be 1 black colored RJ45 Cat-6 grade Systimax (or equivalent) data jack on left side position.
 - iii. Right side jack shall be 1 ivory colored RJ45 Cat-6 grade Systimax (or equivalent) data jack on right side position.



- b. Data horizontal dual jack configuration, no phone:

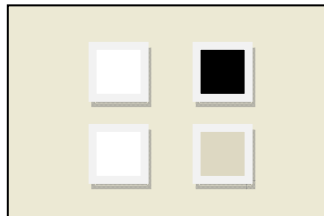
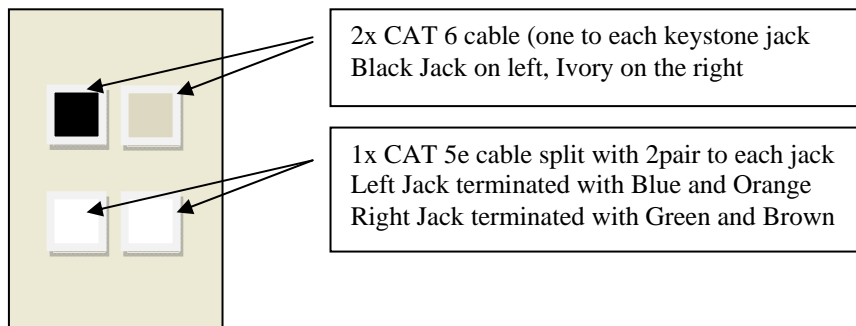
OI&T Cabling Standards and Criteria

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- i. Horizontal installation will rotate faceplate clockwise and data positions clockwise.
- ii. Top jack shall be 1 black colored RJ45 Cat-6 grade Systimax (or equivalent) black data jack on top position.
- iii. Bottom jack shall be 1 ivory colored RJ45 Cat-6 grade Systimax (or equivalent) ivory data jack on bottom position.

F. Voice Data Drops shall be in quad jack configurations as described below:

- a. Quad jack configuration:
 - i. Voice/data face plate shall be ivory quad faceplate with 2 eight position RJ45 Systimax data jacks or equivalent; on top #1 Black jack MGS-400-003 and #2 Ivory jack MGS-400-246, one data cable for each jack.
 - ii. Bottom two jacks #3, and #4 shall be white voice six position RJ11 Systimax M1AH-262 jack or equivalent, one wire split with one pair to each jack and 2 pair spare (1 jack has 2 pairs terminated (Blue and Orange) and the second jack also has 2 pairs terminated (green and brown)).



- iii. For horizontal configuration faceplate will be rotated clockwise with jack orientation also rotated clockwise remaining as #1=black, #2 =ivory, #3 ,#4 =phone




OI&T Cabling Standards and Criteria

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- G. All cable runs shall follow the cable trays that are above the suspended ceilings and terminated at the closet specified by design drawings, COTR, and/or OI&T.
- H. Cables shall not be attached to removable ceiling grid supports or laid directly on the ceiling grid. Cables shall not be attached to or supported by fire sprinkler heads or delivery systems or any environmental sensor in the ceiling air space.
- I. In areas where the cable does not traverse conduit, cable trays or ducts, the contractor shall bundle the cables in bundles of 48 (1 bundle per 48-port patch panel). Cable bundles shall then be supported by J-hooks attached to existing building structure at a maximum of five (5) foot intervals.
- J. All work shall be installed with Cat-6 equipment and cables. In the case in which existing Cat-5 patch panels are available in the voice/data closets, and there is no further room on the racks to accommodate a new Cat-6 patch panel, then the Contractor will seek further guidance from OI&T and COTR on how to proceed.
- K. If a voice/data closet contains new and existing patch panels with current manufacturer's product warranties, then the contractor must be certified to perform additional work, installation, and use only approved equipment (i.e. cables, jacks, etc.) such that any additional work on that patch panel will not null and void the current manufacturer's product warranty.
- L. The Contractor will be responsible for ensuring that the smoke and fire-rated structures (walls, ceiling, and floors) retain their existing smoke or fire-rating in accordance with VA Specification 078400 FIRESTOPPING. Contractors should be aware of any submittals required prior to work commencement. Refer to document located at <http://www.cfm.va.gov/til/spec.asp>
- M. All previously abandoned Voice and/or Data cable in construction area will be removed completely from end to end. If the cable that is to be removed is installed in such a way that it cannot be removed without damaging other cables or equipment, the Contractor shall notify the COTR and OI&T to allow for further direction. If the cable that is to be removed is installed in such a way that it cannot be removed without damaging other cables or equipment, the Contractor shall notify the COTR and OI&T to allow for further direction.
- N. The Contractor is responsible for grounding and bonding all the infrastructure provided in this project. Specifically:
 - a. Use #6 grounding conductors and two-hole irreversible compression connectors to bond racks to the room's telecommunications grounding bus-bar (TGB).
 - b. The contractor shall provide and install the proper grounding kits for the 66 Block and Patch Panels as required by manufacturer.
 - c. The contractor shall ground and bond the telecommunications rack.
- O. The Contractor is responsible to completely clean and dust all areas that work was performed, whether installing or removing cabling or equipment.

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- P. The Contractor is responsible for labeling the following:
- Terminated Cables – at both ends of each cable (the label shall be installed at 3 inches from the termination).
 - Termination equipment (66 block and/or patch panels)
 - Faceplates.
 - Panels to be sequentially numbered with electronic labels of OI&T number scheme #.1 #.2 with no omissions or duplications.
 - IRM will provide the appropriate location numbers to the COTR, and contractors will only use those numbers to label the jack, cable, and panel
- Q. All data/voice locations on the design plans will use our standards symbology as follows:
- For 1 wire voice only - 
 - For 2 wire Data Only- 
 - For 1 Voice wire and 2 Data wires at a single location- 
- R. The Contractor shall certify the data cables as a TIA Cat6 Permanent Link and test the cables using Fluke DTX1800 or equivalent tester. Test results shall be furnished to OI&T upon completion of testing via electronic in .pdf compatible format.
- S. Certified PASS test result and warranty should be provided to IRM at least three weeks before activation.
- T. If the connected cable in the faceplate does not pass certification, the cable from the faceplate shall be re-terminated and re-certified. In the case with the Voice runs the cables must PASS continuity, opens and wire-map certification. If any line should not PASS, the contractor shall install a new Cat6 cable up to the limit established for the project.
- U. OI&T requires a minimum of one (1) week to review test results, verify locations, and problem areas in order to confirm the resolutions measure necessary for the Contractor to resolve. Furthermore, the test results shall be supplied to OI&T at least 3 weeks before cable plant system is scheduled to be put into operation. Contractor must meet OI&T's entire Cabling Standards and Criteria, as outlined in this document, before COTR signs off on the project.

2. Additional Specifications for Basic Data Cable Installations

- A. Data closets shall be designed and/or constructed so that ease of use, maintenance, and sprinkler covering (where applicable) is foremost. The data racks shall be standard 'free' standing 2 post data racks or 'wall mounted cabinet' types (to be approved in submittal form – refer to Section 4). The fiber optic panel shall be the topmost panel on the rack and subsequent panels will be below the fiber panel and shall alternate between Patch Panels and Cable Management Panels (3-1/2" patch panels to be separated by 3-1/2" cable management panels), while leaving available room for network equipment. A drip loop of all wires will be provided from closet sleeve to closet floor before terminating in rack panels. Additionally, vertical cable management systems shall be provided for both sides of the rack - front and rear cable management - from the floor to top of rack.

OI&T Cabling Standards and Criteria

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Panels shall be sequentially numbered with electronically printed labels per OI&T's number scheme (#.1 #.2), with no omissions or duplications.

- B. All information system closets – including telephone only, data only, or combined telephone and data – shall be designed and/or constructed to provide, at the minimum, unobstructed access to:
 - a. One (1) ivory colored duplex or quad 110vac, 15 or 20-amp electrical outlet with an ivory colored cover plate, on a dedicated circuit with isolated ground, for use in the *normal* power circuitry.
 - b. One (1) red colored duplex or quad 110vac, 15 or 20-amp electrical outlet with an red colored cover plate, on a dedicated circuit with isolated ground for use on the hospital's *critical* power circuitry.

The location of the outlets will be determined by the COTR and OI&T.

- C. All cable will be fished through the wall and above the suspended ceiling (if applicable). If construction is to be performed where there is no suspended ceiling or access above and through the suspended ceiling or walls is severely limited, the Contractor may use an approved “surface mounted raceway” (to be approved in submittal, refer to Section 1) and shall have accompanying surface mounted jacks.
- D. Terminate the data closet side using Systimax 48 Port CAT6 Patch Panel 1100GS3-48 or equivalent, IAW the 20 year product manufacturer's warranty.
- E. The Contractor shall be required to install a new Cat-6 patch panel in any cases where new Cat-6 wires are being pulled into an existing closet that currently has only Cat-5 patch panels. At no time will the Contractor terminate Cat-6 cables on to a Cat-5 patch panel. If there is a density issue on the patch panel which prevents the additional Cat-6 patch panel, the cable contractor will work with the COTR and OI&T representative to develop solutions.
- F. In the case of renovations where Cat-6 cabling exists, the cat-6 data cable can be saved and re-used with original numbering system where feasible and approved by the COTR and OI&T representative. In this instance, if any of the data lines are not being re-used, the Contractor shall remove all abandoned cable from the station side to data closet.
- G. Upon completion of job, data closets will be cleaned of all dust and debris from rack, rack panels, cable managers, walls, floor and ceilings.

3. **Additional Specifications for Basic Voice Cable Installations**

- A. Phone closet should be terminated using Siemon Co. S66M1-50 66 blocks wall mounted using 89B brackets or the equivalent. Each station will be tested for continuity and labeled in accordance with OI&T's numbering system with documentation provided to the VA representative.

OI&T Cabling Standards and Criteria

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- B. One cable will be run from the station side to OI&T designated Phone closet that is identified with an electronically printed label.
- C. All cable will be fished through the walls if possible. Otherwise, Panduit surface raceway systems will be used along with surface mounted jacks. Terminate the station side with Systimax M1AH-262 white voice jacks or equivalent. Terminate the phone closet side using Siemon Co. S66M1-50 66 blocks wall mounted using 89B brackets. Each station will be tested and labeled in accordance with VA numbering system with documentation provided to the VA representative.
- D. If area is being remodeled, existing data and voice drops will be saved and re-used with original numbering system where economical. If any data or voice lines are not being re-used, contractor will remove all cable from station to phone closet. Phone locations to be identified by numbering system provided by Hines OI&T, who will also direct installation requirements as necessary.

4. Submittal Requirements:

- A. All work shall be performed by a Manufacturer's Certified Business Partner (MCBP); furthermore, the Contractor shall follow the current design and installation guidelines in this specification and those of the VA Master Specifications (<http://www.cfm.va.gov/til/spec.asp>). **Installers must be able to furnish proof that they are currently certified, by the product manufacture, to install the product in accordance with the requirements to meet the 20 manufacturer's product warranty.** The prime/general contractor (GC) shall be responsible furnish a photocopy of the installers' certification to the VA Contracting Officer's Technical Representative (COTR) before any installation can take place.
- B. In addition to the above MCBP certification, the Contractor shall obtain and supply proofing documents that the installer(s) are current on their federal, state, and local certifications (where applicable), which shall be in accordance with the current edition of the National Electrical Code, the current edition of the National Electrical Safety Code, the current edition of the Building Industry Consulting Services, International (BICSI) Telecommunications Distribution Methods Manual, the current edition of the BICSI Cabling Installation Manual, the latest issue of the ANSI/TIA/EIA Standards as published by Global Engineering Documents as TIA/EIA Telecommunications Building Wiring Standards, and all local codes and ordinances.
- C. All installations of Information Systems equipment (data, telephone, racks, arrays, panels, etc) shall be tested by a certified professional, as described by the Product Manufacturer supplying the warranty. The test results and warranty information will be submitted to the COTR and OI&T representative before turn-over and final billing will be processed.
- D. Furthermore, before work can begin, the Contractor shall provide the following submittals to the COTR:

OI&T Cabling Standards and Criteria

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- a. Cut-Sheets of Fire Stopping material and components shall be supplied when penetrations or other equipment passing between floors, walls, or applicable subsystems being part of the implementation.
- b. Cut-Sheets shall be provided the COTR for all proposed items used to implement a plan, to include: panels, cabinets, switches, racks, cabling, hangars, etc. to ensure that they meet or exceed this specification or the specification set forth in design drawings provided by an A/E firm.
- c. **CAD and/or Shop Drawings, as specified by the Scope of Work or Design Drawings, shall be submitted to the COTR and OI&T representative prior to installation of a system or subsystem, upon any recommended or directed deviation, and upon completion of installations for use as As-Built documentation.**

5. Attachments:

These are sample Identification badges and warranty from the product manufacture. Hines requires that all technicians provide proof that they are certified through the product manufacture to install and service the product they are installing. Furthermore upon completion of the project, the contractor will provide a warranty certificate that the work is covered under a 20 year warranty from the product manufacturer.

Attachment #.1- Sample Identification badge from product manufacturer

Attachment #.2- Sample 20 year product warranty certificate

Attachment #3- Sample 20 year product warranty certificate

EDWARD J. HINES, JR. VA HOSPITAL
RENOVATE PAS-EPC
HINES, ILLINOIS

**SECTION 00 22 31
CHECKLIST FOR BIDDERS
IMPORTANT - PLEASE READ CAREFULLY**

PART 1 - GENERAL

1.1 TO INSURE YOUR BID IS COMPLETE, PLEASE CHECK THE FOLLOWING:

- A. Have you rechecked your estimate? Are all items and amounts included?
- B. Are bid amounts for all items entered in proper spaces on SF-1442, Solicitation, Offer and Award (construction, Alteration, or Repair)?
- C. Have you signed and dated accompanying documents that are to be submitted with the bid?
- D. Have you acknowledged on SF-1442, receipt of all amendments (if any) issued for this solicitation?
- E. Have you properly completed and checked the appropriate boxes and spaces for every bidder representation and certification in the Representations and Certifications?
- F. Does your bid guarantee conform to the requirements of SF-1417, Pre-Solicitation Notice? Did you use the prescribed Standard Form 24 for submitting the Bid Bond?
- G. Have you carefully read every provision in Instructions to Bidders and Notices?
- H. Have you carefully read the requirements concerning the Buy American Act?

- - - E N D - - -

EDWARD J. HINES, JR. VA HOSPITAL
RENOVATE PAS-EPC
HINES, ILLINOIS

SECTION 00 62 19
INFECTION CONTROL RISK ASSESSMENT FOR
CONSTRUCTION/RENOVATION PROJECTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This form is for ensuring the inclusion of applicable infection control measures. Contractor shall complete and submit form in addition to meeting infection prevention measures as specified in Section 01 00 00, GENERAL REQUIREMENTS.

Infection Control Risk Assessment for Construction / Renovation Projects				
Project Name: Renovate PAS-EPC			Project Number: 578-11-094	
Project Planner:			Extension:	
Building Number: Building 1			Floor(s):	
Project start date:			Projected completion date: / /	
Construction Activity		Infection control risk group		
	TYPE A: Inspection, non-invasive activity, low noise, no vibration DUST LEVEL Low	X	GROUP 1: Low office areas, FMS areas, all non-patient care areas.	
	TYPE B: Small scale, short duration, low-moderate noise, low-moderate vibration DUST LEVEL: Moderate to High		GROUP 2: Medium All other patient care areas i.e. ultrasound, Rehab, Occupational Therapy.	
X	TYPE C: Requires more than one work shift to complete, low-moderate noise, moderate-high vibration DUST LEVEL Moderate to High		GROUP 3: Medium/High ED, Radiology/MRI, , , admissions, food service areas, laboratories.	
	TYPE D: Major demolition and construction activities Requiring consecutive work shifts, moderate-high noise, moderate-high vibration DUST LEVEL High		GROUP 4: Highest Operating rooms, SPD ICU's Outpatient areas, oncology anesthesia, post anesthetic recovery all scope areas, Pharmacy, Renal Dialysis	
Project Class Determination Matrix				
Construction Activity →	Type "A"	Type "B"	Type "C"	Type "D"
Risk Level ↓				
Group 1	I	II	II	III
Group 2	I	II	III	IV
Group 3	I	III	III	IV
Group 4	III	IV	IV	IV
Contractors Actions by Project Class				
CLASS I	1. Execute work by methods to minimize raising dust from construction operations. 2. Immediately replace any ceiling tile displaced for visual inspection.	3. Contain construction waste before transport in tightly covered containers. 4. Emergency Preparedness training/posting/ID card.		
CLASS II	1. Provide active means to prevent air-borne dust from dispersing into atmosphere. 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tap	4. Block off and seal air vents. 5. Wipe surfaces with disinfectant. 6. Contain construction waste before transport in tightly covered containers. 7. Emergency Preparedness training/posting/ID card.		
CLASS III	1. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 2. Complete all critical barriers before any work begins. 3. Maintain negative air pressure within work area utilizing HEPA equipped air filtration units. 4. Provide dust mat at entrance and exit of work area.	5. Contain construction waste before transport in tightly covered containers. 6. Wet mop or vacuum with HEPA filtered vacuum before leaving work area. 7. Cover transport receptacles or carts. Tape covering. 8. Emergency Preparedness training/posting/ID card.		
CLASS IV	1. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 2. Complete all critical barriers before any work begins. 3. Maintain negative air pressure within work area utilizing HEPA equipped air filtration units. 4. Provide adhesive walk-off mat with Provide dust mat at entrance and exit of work area. In the anteroom at entrance and exit of work area. 5. Seal holes, pipes, conduits and punctures appropriately. 6. Vacuum the entire work area with HEPA vacuums or wet mop with disinfectant at the completion of project.	7. Do not remove barriers from work area until competed project is thoroughly cleaned by housekeeping and inspected by the Infection Control Department Safety Section and Engineering Service. 8. Remove barrier materials carefully to minimize spreading dust and debris associated with construction. 9. Contain construction waste before transport in tightly covered containers. 10. Cover transport receptacles or carts. Tape covering. 11. Remove isolation of HVAC system in areas where work was performed at the end of the project. 12. Emergency Preparedness training/posting/ID card.		

Projects Classification _____

Date _____

Project Planners signature _____

Contractor's signature _____

Onsite construction Supervisor signature _____

FAX TO INFECTION CONTROL AT 22481 AND SAFETY AT 22318

EDWARD J. HINES, JR. VA HOSPITAL
RENOVATE PAS-EPC
HINES, ILLINOIS

SECTION 00 62 21
PRECONSTRUCTION/SAFETY RISK ASSESSMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This form is for ensuring the inclusion of applicable safety measures. Contractor shall complete and submit form in addition to meeting safety measures and requirements as specified in Section 01 00 00, GENERAL REQUIREMENTS.

---END---

Pre-Construction/Safety Risk Assessment

Location of Construction (Bldg No./Room No.): Building 1		Project No.: 578-11-094	
Project Title: Renovate PAS-EPC			
Project Coordinator:		Project Start Date:	
Contractor Performing Work:		Estimated Duration:	
Supervisor:		Telephone:	
Description of project:			
Construction Activities			
<p>The following projects <u>do not</u> require completion of the Pre-Construction/Safety Risk Assessment form:</p> <ol style="list-style-type: none"> 1. Painting and installation of new wallpaper in business offices and non-patient areas. 2. Painting in a patient room, if closed for painting and less than 3 square feet of wall area is to be patched and painted. Contractor shall replace the air filter for the room's air conditioning unit upon completion of painting. 3. Installation of a soap dispenser/needle box/paper towel holder in a patient room 4. Repair of a window blind. 5. Ceiling tile replacement for areas less than ten (10) 2' x 2' tiles, if not in business offices and non-patient areas. 6. Ceiling tile replacement for areas less than five (5) 2' x 2' tiles in a patient area, if patient is out of the immediate area and clean up can be accomplished before patient returns. 7. Minimal repair of Nurse Call System/TV/Bed/Telephone. 8. Checking or replacing of electric outlet. 9. Replacing a light bulb. 10. Unstopping sink/commode with no water on floor. 11. Unstopping commode when water on floor requires maintenance to have Housekeeping clean area immediately. 12. Repair of a medical gas outlet. (Front Body) 13. Taking air balance measurement readings. 14. Checking air conditioning unit/system. 15. Intermediate jobs that create a moderate amount of dust inside the room with negative air pressure maintained in the room via use of HEPA-equipped unit with minimum 10 ACH, and all air discharged outside. The HEPA unit must continue running 2 hours after completion of job and Housekeeping must clean room before the HEPA unit is removed from room. All work and use of HEPA unit must be documented and copies forwarded to Infection Control and Safety. NOTE: All duct vents to be sealed off during work! 			
Yes	No		
		Will there be noise generated that will impact a department adjacent to, above, or below the construction area?	
		a. If so, these departments must be notified.	
		b. How are you going to reduce the noise to an acceptable level?	
Yes	No		
		Will there be vibration generated that will impact a department adjacent to, above, or below the construction area?	
		a. If so, these departments must be notified each time this type of work will be performed.	
		b. How are you going to reduce the vibration to an acceptable level?	
Yes	No		
		Are Emergency Procedures in place and posted on each job for accidental events that could greatly impact Patient Care or Life Safety to the facility? Typically included items in these procedures are: <ul style="list-style-type: none"> Emergency telephone numbers of key departments. A contingency plan describing the location of main valves, switches, and controls. A contingency plan for unexpected outages. 	
Environment			
Yes	No	Are any of the following environmental hazards present?	
		Will hazardous chemicals be used on this project? How will fumes and odors be controlled? Material Safety Data Sheets (MSDS) are required.	
		Is asbestos abatement required on this job? If so, notify Safety at the Pre-Construction Meeting.	
		Will there be hot work done on this project? If so, then a hot work permit must be posted on the job site. All hot work must have a fire watch assigned to each area while the hot work is being performed.	
		Will confined space entry be required on this project? If so, the VAMC Confined Space Entry Program must be followed.	
Utility Failures			
Yes	No	Will any of the following systems be out of service at any time during the project?	
		<ul style="list-style-type: none"> Fire alarm (For outages greater than 4 hours, Interim Life Safety Measures must be implemented.) Sprinkler (For outages greater than 4 hours, Interim Life Safety Measures must be implemented.) Electrical Domestic water Oxygen Sewage HVAC 	

Yes	No	
		Will there be any work that will require activation of the Interim Life Safety Measures (ILSM) during this project? Other work may require ILSM's, but typical work requiring ILSM implementation are: <ul style="list-style-type: none"> Any construction that impacts an exit or stairs, Any construction that impacts major breaches in a fire or smoke wall, Taking the main fire protection system out of service (sprinkler), Taking the main fire alarm system out of service, Taking the "area" fire or fire alarm systems out of service for more than 4 hours within a 24-hour period.
		Implementation of the ILSM requires a fire watch and the ILSM forms to be completed.
Additional Safety Concerns		
Yes	No	
		Will construction affect exit routes from occupied areas adjacent to construction site?
		Will project affect traffic patterns in area? <i>If yes, explain plan.</i>
		The following must be completed prior to any construction activities:
		<ul style="list-style-type: none"> Construct separation walls prior to project start. Fire protection systems must remain intact. Provide extra fire extinguishers in work areas. Maintain exit lights in work area. Maintain negative air pressure in construction area (24/7) throughout project duration. There cannot be any return air from within the construction area to the rest of the building. Redirect egress routes, do not allow egress routes to pass through construction areas. Provide and maintain "Construction Area-Do No Enter" signs on doors leading into the construction area. Maintain up-to-date daily logs and maintain a current Hot Work Permit. Provide and install no-slip mats at doors exiting construction area. All debris removal must be by covered cart. Maintain a clean and orderly work area. Determine how, if at all, this project will affect the departments above, below, and adjacent to this project?
Air Quality and Infection Control		
Construction activity types are defined by the amount of dust that is generated, the duration of the activity, and the amount of shared HVAC systems. Contact VAMC 's Safety and Infection Control Departments if any activity is questionable under these guidelines.		
Yes	No	
		Will dust be generated during this project? <i>If yes, explain location of and plan for interim dust barriers or attach floor plan with barriers clearly marked.</i>
		Will debris removal be necessary? <i>If yes, explain plan for debris removal and control.</i>
		Negative airflow ventilation and filtration in place and assessed for effectiveness.
		Exhaust fans in-place and functioning.
		Air supply duct to area closed and HEPA filtration unit in-place and functioning in adjacent patient care area?
		Will work be done in a sterile area? <i>If so, how will sterile atmosphere be maintained (to include access in/out of the work area)?</i>
Type A	Inspections and Non-Invasive Activities or Small Scale/Short Duration Activities. (Refer to Infection Control Risk Assessment for Type Selection)	
Yes	No	
		Removal of ceiling tiles for visual inspection (limited to 1 tile per 50 square feet)
		Painting (excludes sanding)
		Wall covering—Describe work to be done:
		Electrical trim work. Describe:
		Minor plumbing. Describe:
Type B	Small Scale, Short Duration Activities that create minimal dust. (Refer to Infection Control Risk Assessment for Type Selection)	
Yes	No	
		Installation of telephone and computer cabling
		Access to chase spaces
		Sanding of walls for painting or wall covering (minor repairs—excludes sanding for drywall finishing)

Type C		Any work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies. (Refer to Infection Control Risk Assessment for Type Selection)
Yes	No	
		Sanding of walls--drywall finishing
		Removal of <input type="checkbox"/> floor coverings <input type="checkbox"/> ceiling tiles <input type="checkbox"/> casework Describe:
		Cutting of walls or ceiling. Describe:
		New wall construction
		Minor ductwork or electrical work above ceilings
		Major cabling activities
		Activity cannot be completed within a single work shift
Type D		Major demolition and Construction Projects. (Refer to Infection Control Risk Assessment for Type Selection)
Yes	No	
		Will require heavy demolition or removal of a complete ceiling system
		New construction
Contractor Signature		COTR Signature
Date:		Date:

EDWARD J HINES, JR. VA HOSPITAL
RENOVATE PAS-EPC
HINES, ILLINOIS

SECTION 00 63 25
SUBSTITUTION REQUEST

To: _____ Substitution Request (SR): _____

_____ From: _____

Attention: _____ Date: _____

Work Contract: _____

Specification Section: _____ Article/Paragraph: _____

Drawing: _____ Detail: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Telephone: _____

Trade Name: _____ Model: _____

Installer: _____ Address: _____ Telephone: _____

History: ☐ New Product ☐ 2-5 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

☐ Point-by-point comparative data of proposed substitution with specified product attached - REQUIRED BY ARCHITECT

Compliance of proposed substitution with performance requirements of Contract Documents: _____

Life cycle cost or proposed substitution relative to specified product: _____

Reason for not providing specified product: _____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of the Work and Project: ☐ No ☐ Yes; explain _____

Description of Changes to Contract Documents that proposed substitution will require for proper installation: _____

Savings to Owner for accepting substitution: _____ (_____)

Proposed substitution changes Contract Time: ☐ No ☐ Yes; Add/Deduct _____ calendar days.

Supporting Data Attached:

☐ Product Data ☐ Drawings ☐ Tests ☐ Reports ☐ Samples ☐ _____

Contractor certifies:

- Contractor has thoroughly evaluated proposed substitution and has determined proposed substitution will result in total Work which is equal to or better than the Work originally required by Contract Documents, in every respect of significance, except as otherwise specifically stated in Substitution Request Form, and that proposed substitution will perform adequately in application indicated, regardless of equality and exceptions thereto. Contractor waives rights to additional payment and time which may subsequently be necessitated, by failure of substitution to perform adequately, and for required work to make corrections thereof.
 - Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified.
 - Same warranty will be furnished for proposed substitution as for specified.
 - Same maintenance service and source of replacement parts, as applicable, is available.
 - Proposed substitution will not affect or delay progress of the Work.
 - Cost data is complete. Claims for additional costs and time related to accepted substitution which may subsequently become apparent are to be waived and for required work to make corrections thereof.
 - Proposed substitution does not affect dimensions and functional clearances.
 - Payment will be made for evaluation review of proposed substitution, and for any changes to design of the Work and Project, and to Contract Documents caused by accepted substitution, including architectural and engineering services.
 - Payment will be made for other separate contractors, if any, and Owner for increased cost of other work caused by accepted substitution.
 - Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.
-

Submitted by: _____

Signature: _____

Contractor: _____

Address: _____

Telephone: _____

Attachments: _____

ARCHITECT REVIEW AND ACTION

☐ Substitution reviewed - Make submittals in accordance with Specification Section 01 33 23 - Shop Drawings, Product Data, and Samples.

☐ Substitution reviewed with comments - Make submittals in accordance with Specification Section 01 33 23 - Shop Drawings, Product Data, and Samples.

☐ Substitution rejected - Use specified products.

☐ Substitution Request received too late - Use specified products.

Reviewed by: _____ Date: _____

Additional Comments: ☐ Contractor ☐ Architect ☐ _____

SECTION 01 00 00
GENERAL REQUIREMENTS

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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 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 Renovate PAS-EPC, Building 1, Section F&G, First Floor, Edward J. Hines, Jr., VA Hospital, Hines, Illinois as required by drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the Contracting Officer's Technical Representative. (COTR)
- C. Time for Completion: The duration of this project as shown on Drawings and described in Specifications, will be **510** days for completion and should be reflected as such.
- D. Offices of A. Epstein & Sons, Int'l., Inc., 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.
- 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.
- F. Prior to commencing work, general contractor shall provide proof that a OSHA certified "competent person" (CP) (29 CFR 1926.20(b)(2) will maintain a presence at the work site whenever the general or subcontractors are present.
- G. Training:
 - 1. Beginning July 31, 2005, all employees of general contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course and /or other relevant competency training, as determined by VA CP with input from the ICRA team.
 - 2. Submit training records of all such employees for approval before the start of work.

H. Submittals:

1. All submittals must be submitted to the VA and A/E prior to commencing work. One courtesy copy shall be sent to the VA while five copies are simultaneously sent to the A/E. The submittal log shall be submitted to the VA with a list of submittals required per the specifications within ten calendar days of this Pre-construction meeting.

I. Schedule of Values/Progress Chart:

1. Progress Chart must be submitted to the VA within ten calendar days of this Pre-construction Meeting. Prior to commencing work, the contractor shall submit a detailed schedule of work (including phasing, if any) from the starting day to the day of completion prior to commencing work.

J. Subcontractor List:

1. Within ten calendar days of this Pre-construction meeting, submit to the VA a list of all subcontractors including the company name, address, phone number and contact person.

K. Superintendent On/Off Jobsite:

1. The Superintendent on the job should be on the job site during the work. The Superintendent on the job should sign the Log book in Engineering Office at the beginning of each workday. The VA must be made aware of when the contractor is on or off the Jobsite.

L. Daily Logs, Progress Chart, Payrolls & Invoice:

1. All contractors shall submit to the VA a completed Daily Log to the COTR at the end of working day. The daily log shall be on the form provided by the COTR at the Pre-construction meeting. All invoices shall be submitted in the Government Form 08-6001a. Payment applications will not be processed until the Daily Logs are up to date for that month, payrolls are received and updated monthly progress chart is received by Project Engineer.

M. Bi-monthly meeting:

1. The Project Manager of the job should attend bi-monthly construction review meeting. The schedule of these meetings shall be coordinated with Project Engineer.

N. HOURS OF WORK:

1. Due to the nature of this work, all work shall be performed and completed during normal work hours only (Monday through Friday, 7:00 a.m. to 3:30 p.m.), except for national holidays when the facility is closed for normal operation.

O. CONSTRUCTION PHASES:

1. Phase 1 Construction shall include the work in Building 1, Section F, First Floor. Phase 2 Construction shall include the work in Building 1, Section G, First Floor.

1.2 STATEMENT OF BID ITEM(S)

- A. ITEM I, **Base Bid:** Work includes general construction, alterations, mechanical and electrical work, utility systems, necessary removal of existing structures and construction and certain other items. The detailed scope of work includes the full gut renovations of two spaces in two construction phases for two end users: Library Services and Patient Administrative Services/Emergency Preparedness Center. These spaces are located in Building 1, Sections F & G, on the first floor. The Library Services scope is approximately 1,890 SF and includes an office area, reading rooms, stack area, and storage. The construction of these spaces includes removal and replacement of walls, windows, doors, flooring, ceiling tiles, plumbing, electrical, data & phone, signage, fire protection, HVAC, and asbestos, lead, and mold abatement work. The PAS/EPC scope is approximately 8,900 SF and includes a conference room, training room, open office space, a Call Center space, private meeting rooms, two small restrooms, and storage space. The construction of these spaces includes removal and replacement of walls, doors, flooring, ceiling tiles, plumbing, electrical, data & phone, signage, fire protection, HVAC, and asbestos and lead-based paint abatement work. It is expected that the construction of this project be broken down into two phases. The first phase includes the Library Services scope of work and the second phase includes the PAS/EPC scope

of work. **Refer to contract documents to understand the complete scope of work. The total time to complete this work is 510 days.**

- B. DEDUCT ALTERNATE NO.1: All the work described in Base bid Item 1 minus furnishing and installing select A/V Equipment including 24 television monitors and 5 smart boards. The total time to complete this work is 490 days.
- C. DEDUCT ALTERNATE NO.2: All the work described in Alternate NO.1 minus removing existing windows and furnishing and installing New Window Glazing. The total time to complete this work is 460 days.
- D. DEDUCT ALTERNATE NO.3: All the work described in Alternate NO.2 minus providing and installing new AHU unit. The total time to complete this work is 400 days.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

- A. Not Applicable.

1.4 CONSTRUCTION SECURITY REQUIREMENTS

- A. Security Plan:

- 1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
- 2. 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. For working outside the "regular hours" as defined in the contract, The General Contractor shall give 3 days notice to the Contracting Officer so that security 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.
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.

D. Key Control:

1. The General Contractor shall provide two duplicate keys and lock combinations to the Project Engineer for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.
2. The General Contractor shall turn over all permanent lock cylinders to the VA locksmith for permanent installation. See Section 08 71 00, DOOR HARDWARE and coordinate.

1.5 FIRE SAFETY

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

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

E84-2008.....Surface Burning Characteristics of Building
Materials

2. National Fire Protection Association (NFPA):

10-2006.....Standard for Portable Fire Extinguishers

30-2007.....Flammable and Combustible Liquids Code

51B-2003.....Standard for Fire Prevention During Welding,
Cutting and Other Hot Work

70-2007.....National Electrical Code

241-2004.....Standard for Safeguarding Construction,
Alteration, and Demolition Operations

3. Occupational Safety and Health Administration (OSHA):

29 CFR 1926.....Safety and Health Regulations for Construction

- B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Project Engineer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.
- C. 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.
- D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- E. Temporary Construction Partitions:
 - 1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas 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, ¾ hour fire/smoke rated doors with self-closing devices.
 - 2. Install one-hour 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.

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

G. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Project Engineer and Safety Manager.

H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Project Engineer and Safety Manager.

I. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.

J. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.

K. 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 Project Engineer and Safety Manager. 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.

L. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Project Engineer and Safety Manager.

- M. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Project Engineer and Safety Manager. Obtain permits from facility Safety Manager at least 48 hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.
- N. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Project Engineer and Safety Manager.
- O. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- P. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- Q. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.
- R. If required, submit documentation to the Resident Engineer that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.
- S. Above ceiling permits shall be obtained from Project Planning Office.

1.6 OPERATIONS AND STORAGE AREAS

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the 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. All material, refuse, demo material, shall be transported before 6:00 am and after 5:00 pm daily and weekends. The weekends work only allowed thru project engineer's prior approval. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. Transport route should be approved by the Project Engineer. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads. No on-site storage or a field office will be provided. If a trailer will be brought on site, request a location for it and get approvals as early as possible.

- 1. The necessity for materials, equipment and tool storage outside the construction and contract area shall be determined by the Project Engineer.

- D. Working space and space available for storing materials shall be as determined by the Resident Engineer.

- E. Workmen are subject to rules of Medical Center applicable to their conduct.

- F. 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 between the hours of 6:00am and 5:00pm or when 24 hours patient occupancies are effected except as permitted by Project Engineer where required by limited working space. The use of repetitive devices (hammer drills, jack hammers, etc.) is prohibited when clinical user reports are received to cease work. Work shall stop until clinical user permits work resumption through Project Engineer.

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.
 4. Use of impact/vibration producing equipment (hammer drills, jack hammers, etc) is prohibited unless approved by Project Engineer.
- G. Phasing: To insure such executions, Contractor shall furnish the Project Engineer 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 Project Engineer two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing to insure accomplishment of this work in successive phases mutually agreeable to Project Engineer and Contractor. as follows:

Phase I: Building 1, Section F, First Floor - Library Relocation

Phase II: Building 2, Section G, First Floor - PAS/EPC Renovation

- H. Construction Area will be vacated by Government in accordance with above phasing beginning immediately after date of receipt of Notice to Proceed and appropriate submittals are received.
- I. 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 Project Engineer.
- J. When the construction area is turned over to Contractor, Contractor shall accept entire responsibility 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 Safety Department, who will be required to respond to an alarm from Contractor's employee or watchman.

K. 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 Project Engineer.

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 Resident Engineer. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Medical Center Director's prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, 27 05 11 REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS for additional requirements.
2. Contractor shall submit a request to interrupt utilities that affect only construction area to Project Engineer, in writing, 48 hours 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 21 calendar days prior to the desired time and shall be performed as directed by the Resident Engineer.
 5. In case of a contract construction emergency, service will be interrupted on approval of Project Engineer. Such approval will be confirmed in writing as soon as practical.
 6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
- L. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.
- M. To minimize interference of construction activities with flow of 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.
 2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the Project Engineer.
- N. Coordinate the work for this contract with other construction operations as directed by Resident Engineer. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.
- O. The contractor is required to discontinue work during Federal Holidays.

- P. The contractor shall obtain above ceiling permit from Room# 119, Bldg. 2 prior to any ceiling tile removal and/or any wall or ceiling penetrations.

1.7 ALTERATIONS

- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the Project Engineer of areas of buildings in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by both, to the Contracting Officer. 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 building.
 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 Project Engineer.
- 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 Project Engineer 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 and VAAR 852.236-88) of Section 00 72 00, GENERAL CONDITIONS.
- C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and Resident Engineer 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 workmen 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 INFECTION PREVENTION MEASURES

- A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded.
- B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to Project Engineer and Facility ICRA team for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

1. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- C. Furnish and maintain NEGATIVE AIR exhaust machines for continuous 24 hr operation in all construction areas through construction duration and turnover. Maintain a 0.02 inch water column pressure and post manometer at inside entrances of the construction area. Furnish, install and continuously maintain construction egress / entry walk-off mats on both sides of the construction barrier in all construction areas through construction duration and turnover. These shall be sticky mat at exterior and moist mat at the construction interior.
- D. HINES VA contractor personnel identification badges shall be secured for all personnel prior to work by person or persons and worn at all times when on HINES VA station premises.
- E. Medical center Infection Control personnel shall monitor for airborne disease (e.g. aspergillosis) as appropriate during construction. A baseline of conditions may 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. In addition:
1. The Project Engineer and VAMC Infection Control personnel shall review pressure differential monitoring documentation to verify that pressure differentials in the construction zone and in the patient-care rooms are appropriate for their settings. The requirement for negative air pressure in the construction zone shall depend on the location and type of activity. Upon notification, the contractor shall implement corrective measures to restore proper pressure differentials as needed.
 2. In case of any problem, the medical center, along with assistance from the contractor, shall conduct an environmental assessment to find and eliminate the source.
- F. In general, following preventive measures shall be adopted during construction to keep down dust and prevent mold.
1. Dampen debris to keep down dust and provide temporary construction partitions in existing structures where directed by Resident

- Engineer. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.
2. Do not perform dust producing tasks within occupied areas without the approval of the Resident Engineer. For construction in any areas that will remain jointly occupied by the medical Center and Contractor's workers, the Contractor shall:
 - a. Provide dust proof one-hour temporary drywall construction barriers to completely separate construction from the operational areas of the hospital in order to contain dirt debris and dust. Barriers shall be sealed and made presentable on hospital occupied side. Install a self-closing rated door in a metal frame, commensurate with the partition, to allow worker access. Maintain negative air at all times. A fire retardant polystyrene, 6-mil thick or greater plastic barrier meeting local fire codes may be used where dust control is the only hazard, and an agreement is reached with the Project Engineer and Medical Center.
 - b. HEPA filtration is required where the exhaust dust may reenter the breathing zone. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. Install HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. Insure continuous negative air pressures occurring within the work area. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced to the medical center. Discharge route and entry shall be approved by the Project Engineer.
 - c. Adhesive Walk-off/Carpet Walk-off Mats, minimum 600mm x 900mm (24" x 36"), 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.
 - d. 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 they are created. Transport these outside the construction area in containers with tightly fitting lids.

- e. The contractor shall not haul debris through patient-care areas without prior approval of the Project Engineer and the Medical Center. Remove debris only after 5pm and it 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.
- f. Using a HEPA vacuum, clean inside the barrier and vacuum ceiling tile prior to replacement. Any ceiling access panels opened for investigation beyond sealed areas shall be sealed immediately when unattended.
- g. 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.
- h. 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.

G. 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.

1.9 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 as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by Resident Engineer.
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. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.
4. PCB Transformers and Capacitors: The Contractor shall be responsible for disposal of the Polychlorinated Biphenyl (PCB) transformers and capacitors. The transformers and capacitors shall be taken out of service and handled in accordance with the procedures of the Environmental Protection Agency (EPA) and the Department of Transportation (DOT) as outlined in Code of Federal Regulation (CFR), Titled 40 and 49 respectively. The EPA's Toxic Substance Control Act (TSCA) Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7 also apply. Upon removal of PCB transformers and capacitors for disposal, the "originator" copy of the Uniform Hazardous Waste Manifest (EPA Form 8700-22), along with the Uniform Hazardous Waste Manifest Continuation Sheet (EPA Form 8700-22A) shall be returned to the Contracting Officer who will annotate the contract file and transmit the Manifest to the Medical Center'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

1.10 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

- 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 workmen, 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 Contracting Officer.
- 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.

(FAR 52.236-9)

- C. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.
- D. Refer to FAR clause 52.236-7, "Permits and Responsibilities," which is included in General Conditions. A National Pollutant Discharge Elimination System (NPDES) permit is required for this project. The Contractor is considered an "operator" under the permit and has extensive responsibility for compliance with permit requirements. VA will make the permit application available at the (appropriate 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.

1.11 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 Resident Engineer. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Resident Engineer 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 workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2) of Section 00 72 00, GENERAL CONDITIONS.

1.12 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.

- B. Layout of Indoor Work: After completion of indoor demolition and prior to commencement of new indoor work, Contractor shall layout work for purpose of verification of existing conditions documented in drawings and coordination with drawings.

1.13 POST DEMOLITION EXISTING CONDITIONS

- A. After completing demolition and prior to beginning new work, Contractor shall conduct an on-site survey of existing conditions to document the existing conditions of the post demolition project site. Contractor shall prepare and provide complete set of Drawings documenting condition and location of existing structure including but not limited to the following information:
 - 1. Exact, dimensioned location of all existing walls, columns, beams, stairs, shafts, doors, windows, ramps and other permanent structures to remain.
 - 2. Location and dimension of all openings and cutouts in existing walls, floors, ceilings and other building structure.
 - 3. Actual built floor to ceiling heights at all floors.
 - 4. Actual built floor thickness, two way slab beam locations, thickness of beams and locations, supplemental framing size and location, opening size, framing and location
 - 5. Locations and dimensions of any existing equipment to remain, including fire protection, plumbing, mechanical and electrical equipment.
 - 6. Survey of existing first floor slab elevations with reference to project benchmark elevation.

- B. Prior to commencement of new work, provide set of complete post demolition existing condition drawings to Contracting Officer's Technical Representative and Architect for purpose of verification of existing conditions and coordination with Drawings. At a minimum the complete set of drawings to include a floor plan and a reflected ceiling plan of each floor level with complete dimensions of post demolition existing conditions as indicated above. Complete set of post demolition drawings to be provided in AutoCAD (Version 2006), PDF Format and printed hard copy.

1.14 ELECTRONIC SUBMITTALS

- A. General: All submittals, with the exception of samples, shall be submitted electronically as portable document files (PDF) through Newforma, or equal electronic system acceptable to Architect and Contracting Officer's Technical Representative, and meet requirements of Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Requests for Information (RFI's): Requests for information (RFI's) shall also be submitted through Newforma, or equal electronic system acceptable to Architect and Contracting Officer's Technical Representative, with attachments in portable document file (PDF) format.

1.15 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 insure compliance, as-built drawings shall be made available for the Resident Engineer's review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the Resident Engineer within 15 calendar days after each completed phase and after the acceptance of the project by the Resident Engineer.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.16 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the Resident Engineer, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed 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

- A. Not Applicable.

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 compliance with the following provisions:
 - 1. Permission to use each unit or system must be given by Resident Engineer. If the equipment is not installed and maintained in accordance with the following provisions, the Resident Engineer 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. 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. Boilers, pumps, feedwater heaters and auxiliary equipment must be operated as a complete system and be fully maintained by operating personnel. Boiler water must be given complete and continuous chemical treatment.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.
- C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

1.19 TEMPORARY USE OF EXISTING ELEVATORS

- A. Contractor will not be allowed the use of existing elevators. Outside type hoist shall be used by Contractor for transporting materials and equipment. Use of existing elevator for handling building materials and Contractor's personnel will be permitted subject to following provisions:

1. Contractor shall use the designated elevators to move the material in and out of the construction area only after 5 P.M. during weekdays and on weekends. Contractor may use one of the Service Elevators in Building No. 200. The Project Engineer will ascertain that elevators are in proper condition.
2. Contractor covers and provides maximum protection of following elevator components:
 - a. Entrance jambs, heads soffits and threshold plates.
 - b. Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.
 - c. Finish flooring.
3. Government will accept hoisting ropes of elevator and rope of each speed governor if they are worn under normal operation. However, if these ropes are damaged by action of foreign matter such as sand, lime, grit, stones, etc., during temporary use, they shall be removed and replaced by new hoisting ropes.
4. If brake lining of elevators are excessively worn or damaged during temporary use, they shall be removed and replaced by new brake lining.
5. All parts of main controller, starter, relay panel, selector, etc., worn or damaged during temporary use shall be removed and replaced with new parts, if recommended by elevator inspector after elevator is released by Contractor.
6. Place elevator in condition equal, less normal wear, to that existing at time it was placed in service of Contractor as approved by Contracting Officer.

1.21 TEMPORARY TOILETS

- A. Provide where directed, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by Resident Engineer, 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.

- B. Contractor may have for use of Contractor's workmen, such toilet accommodations as may be assigned to Contractor by Medical Center. Contractor shall keep such places clean and be responsible for any damage done thereto by Contractor's workmen. 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. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.
- B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.
- C. Contractor shall install meters at Contractor's expense and furnish the Medical Center a monthly record of the Contractor's usage of electricity as hereinafter specified.
- D. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:
 - 1. Obtain heat by connecting to Medical Center heating distribution system.
 - a. Steam is available at no cost to Contractor.

E. Electricity (for Construction and Testing): Furnish all temporary electric services.

1. Obtain electricity by connecting to the Medical Center electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.

F. 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. 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 Resident Engineer's discretion) of use of water from Medical Center's system.

G. Steam: Furnish steam system for testing required in various sections of specifications.

1. Obtain steam for testing by connecting to the Medical Center steam distribution system. Steam is available at no cost to the Contractor.
2. Maintain connections, pipe, fittings and fixtures and conserve steam-use so none is wasted. Failure to stop leakage or other waste will be cause for revocation (at Resident Engineer's discretion), of use of steam from the Medical Center's system.

H. Fuel: Natural and LP gas and burner fuel oil required for boiler cleaning, normal initial boiler-burner setup and adjusting, and for performing the specified boiler tests will be furnished by the Government. Fuel required for prolonged boiler-burner setup, adjustments, or modifications due to improper design or operation of boiler, burner, or control devices shall be furnished by the Contractor at Contractor's expense.

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. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.
- B. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.
- C. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire complex which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a complex 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.
- D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably short period of time during which operating and environmental conditions remain reasonably constant.
- E. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

1.25 INSTRUCTIONS

- A. Contractor shall furnish Maintenance and Operating manuals and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. Manuals: Maintenance and operating manuals (four copies each) for each separate piece of equipment shall be delivered to the Resident Engineer 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 instructions to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. 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 Resident Engineer and shall be considered concluded only when the Resident Engineer is satisfied in regard to complete and thorough coverage. The

Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Resident Engineer, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.27 RELOCATED EQUIPMENT AND ITEMS

- A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing equipment and items indicated by symbol "R" or otherwise shown to be relocated by the Contractor.
- B. Perform relocation of such equipment or items at such times and in such a manner as directed by the Resident Engineer.
- C. Suitably cap existing service lines, such as steam, condensate return, water, drain, gas, air, vacuum and/or electrical, whenever such lines are disconnected from equipment to be relocated. Remove abandoned lines in finished areas and cap as specified herein before under paragraph "Abandoned Lines".
- D. Provide all mechanical and electrical service connections, fittings, fastenings and any other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.
- E. Contractor shall employ services of an installation engineer, who is an authorized representative of the manufacturer of this equipment to supervise assembly and installation of any existing special equipment required to be relocated.
- F. All service lines such as noted above for relocated equipment shall be in place at point of relocation ready for use before any existing equipment is disconnected. Make relocated existing equipment ready for operation or use immediately after reinstallation.

1.28 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT

NOT APPLICABLE

1.29 CONSTRUCTION SIGN

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

1.30 SAFETY SIGN:

Provide a safety sign where directed by Project Engineer. Face of sign shall be 19 mm (3/4 inch) thick exterior grade plywood. Provide two 100 mm by 100 mm (four by four inch) posts extending full height of sign and 900 mm (three feet) into ground. Set bottom of sign level at 1200 mm (four feet) above ground.

- B. Paint all surfaces of Safety Sign and posts with one prime coat and two coats of white gloss paint. Letters and design shall be painted with gloss paint of colors noted.
- C. Maintain sign and remove it when directed by Resident Engineer.
- D. Standard Detail Drawing Number SD10000-02 (Found on VA TIL) of safety sign showing required legend and other characteristics of sign is included in Department of Veterans Affairs Standards.
- E. Post the number of accident free days on a daily basis.

1.31 PHOTOGRAPHIC DOCUMENTATION

A. During the construction period through completion, provide photographic documentation, 250 photographs minimum, of construction progress and at selected milestones including electronic indexing, navigation, storage and remote access to the documentation, as per these specifications. The commercial photographer or the subcontractor used for this work shall meet the following qualifications:

1. Demonstrable minimum experience of three (3) years in operation providing documentation and advanced indexing/navigation systems including a representative portfolio of construction projects of similar type, size, duration and complexity as the Project.
2. Demonstrable ability to service projects throughout North America, which shall be demonstrated by a representative portfolio of active projects of similar type, size, duration and complexity as the Project.

B. Photographic documentation elements:

1. Each digital image shall be taken with a professional grade camera with minimum size of 6 megapixels (MP) capable of producing 200x250mm (8 x 10 inch) prints with a minimum of 2272 x 1704 pixels and 400x500mm (16 x 20 inch) prints with a minimum 2592 x 1944 pixels.
2. Indexing and navigation system shall utilize actual AUTOCAD construction drawings, making such drawings interactive on an on-line interface. For all documentation referenced herein, indexing and navigation must be organized by both time (date-stamped) and location throughout the project.
3. Documentation shall combine indexing and navigation system with inspection-grade digital photography designed to capture actual conditions throughout construction and at critical milestones. Documentation shall be accessible on-line through use of an internet connection. Documentation shall allow for secure multiple-user access, simultaneously, on-line.

4. Before construction, the building, adjacent streets, roadways, parkways, driveways, curbs, sidewalks, landscaping, adjacent utilities and adjacent structures surrounding the building and site shall be documented. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.
5. 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 interior construction of the building. Interior Progressions shall track interior improvements beginning when stud work commences and continuing until Project completion.
6. 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 insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.
7. As-built conditions of exterior skin and elevations shall be documented with an increased concentration of digital photographs as directed by the Contracting Officer's Technical Representative in order to capture pre-determined focal points, such as windows affected by the Work. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive elevations or elevation details.
8. 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 Contracting Officer's Technical Representative. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.

9. Miscellaneous events that occur during any Contractor site visit, or events captured by the Department of Veterans Affairs independently, shall be dated, labeled and inserted into a Section in the navigation structure entitled "Slideshows," allowing this information to be stored in the same "place" as the formal scope.
 10. Customizable project-specific digital photographic documentation of other details or milestones. Indexing and navigation accomplished through interactive architectural plans.
 11. Regular (8 max) interior progressions of all walls of the entire project to begin at time of substantial framed or as directed by the Contracting Officer's Technical Representative through to completion.
 12. Detailed Interior exact built overlapping photos of the entire building to include documentation of all mechanical, electrical and plumbing systems in every wall and ceiling, to be conducted after rough-ins are complete, just prior to insulation and or drywall, or as directed by Contracting Officer's Technical Representative.
 13. Finished detailed Interior exact built overlapping photos of all walls, ceilings, and floors to be scheduled by Contracting Officer's Technical Representative prior to occupancy.
 14. In event a greater or lesser number of images than specified above are required by the Contracting Officer's Technical Representative, adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- C. Images shall be taken by a commercial photographer and must show distinctly, at as large a scale as possible, all parts of work embraced in the picture.
- D. Coordination of photo shoots is accomplished through Contracting Officer's Technical Representative. Contractor shall also attend construction team meetings as necessary. Contractor's operations team shall provide regular updates regarding the status of the documentation, including photo shoots concluded, the availability of new Progressions or Exact-Built viewable on-line and anticipated future shoot dates.
- E. Contractor shall provide all on-line domain/web hosting, security measures, and redundant server back-up of the documentation.

- F. Contractor shall provide technical support related to using the system or service.
- G. Upon completion of the project, final copies of the documentation (the "Permanent Record") with the indexing and navigation system embedded (and active) shall be provided in an electronic media format, typically a DVD or external hard-drive. Permanent Record shall have Building Information Modeling (BIM) interface capabilities. On-line access terminates upon delivery of the Permanent Record.

1.32 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 Contracting Officer's Technical Representative verbally, and then with a written follow up.

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Safety, Rules & Procedures for Contractors

Hospital Policy: All construction personnel shall be orientated and trained on hospital safety, rules and procedures before starting work and periodically throughout the project duration. The general contractor and subcontractors' field supervisors/foremen shall be thoroughly familiar with Specification Section 01010 "General Requirements" and those items covered in the "Field Supervisors/Foremen Agreement" below.

Purpose: To ensure that each individual contractor employee is responsible for complying with established hospital standards, applicable OSHA Safety Requirements, federal, state and local environmental regulations, wearing prescribed safety equipment, and preventing avoidable accidents.

Procedure: Each individual Field Supervisor/Foreman is to review, understand and acknowledge (sign) the following information prior to the commencement of work scheduled at this facility. A contractor's pay request will only be approved after the Contracting Officer Technical Representative (COTR) has received signed agreements from each field supervisor/foreman requesting to be paid on an invoice.

Field Supervisors/Foremen Agreement

Access to Construction Areas

- ☐ All contractors shall check-in with the COTR before beginning a project or work. The contractor shall be prepared to provide the following information; scope of work, authorization, duration, as well as other pertinent information.
- ☐ Access is limited to areas such as critical care, patient care and surgical units, as well as mechanical/electrical rooms. Access can be obtained through the COTR.
- ☐ Access to any floors of the facility after normally scheduled work hours (Monday-Friday, 7:00am – 4:30pm) must be scheduled in advance with the COTR. Police reserves the right to refuse access to anyone without prior authorization and identification.
- ☐ Ready access for Engineering, Safety, Police and Fire Department shall be maintained to all areas under construction at all times.
- ☐ Areas under construction shall be locked during non-business hours. Keys and cylinders for this purpose are obtained through the COTR. Contractors will not put their locks on any doors without COTR approval.

Accident and Injuries

- ☐ The contractor must post emergency phone numbers and treatment facilities for use by contractor employees if injured on the job or in need of medical treatment.
- ☐ Work site injuries must be reported to the COTR. The VA accident reporting form is Number 2162. The COTR/Safety/or Security and Police Service will initiate the 2162. The injured individual will need to complete the narrative portion of the report.

Asbestos

- ☐ There are both friable and non-friable asbestos-containing materials located within the hospital complex. Inspection reports are available from the COTR. Contractors are required to be aware of the asbestos material located in the vicinity of their work. Further, all contractors are expressly forbidden to disturb any asbestos-containing materials unless specifically authorized in writing by the COTR. Under no circumstances are any materials supplied or installed by the contractor to contain asbestos in any form or quantity.
- ☐ Asbestos removal contractors will be trained and licensed, and will follow OSHA, VA Specifications, state and local regulations from notification to disposal.
- ☐ A VA Representative will verify the adequacy of the barriers and ventilation before any asbestos removal work is conducted.
- ☐ The contractor(s) is responsible for monitoring their employees' exposure to asbestos.

- ❑ Additional asbestos removal specifications will apply.

Clean-up

- ❑ All work activities within occupied portions of the facility shall be immediately cleaned and restored to its original finished condition upon completion of the activity. If the activity continues into the next workday, the area shall be left safe, clean, and presentable.
- ❑ Public restrooms are not to be used for cleaning tools or equipment. Janitor's slop sinks are available for this purpose. If janitor's closets are used they must be cleaned.
- ❑ Trash, combustible waste, and excess construction materials must be removed daily to prevent accumulation. Contractors must arrange for the removal of their debris and waste.
- ❑ All work for an area must be confined within that space. Public corridors, stairwells, equipment rooms, and vacant floors are not to be used for the storage of materials or as a workshop. Tracking of construction dirt into the public corridors or stairwells must be prevented. The contractor will provide tack pads at all entrances and exits from the construction space.
- ❑ If smoke detectors are covered during dust-producing activities, they must be uncovered at the end of each day.
- ❑ All contractors working above the ceiling are required to reset all disturbed ceiling tiles by the end of the day.

Compressed Gas Cylinders

- ❑ Compressed gas cylinders are very dangerous if not treated properly.
- ❑ Employees who work with compressed gas cylinders must have specific training in that area.
- ❑ Make sure that they are secured properly when in use or in storage.
- ❑ Always keep the caps on the cylinders when they are not in use.
- ❑ Hot work permit(s) are required.

Confined Space

- ❑ Consult with the COTR before entering sewers, manholes, and underground vaults. Identify which require confined space permits.
- ❑ All construction personnel that require entry into a confined space must abide by the Confined Space Program procedure. NO ONE will be allowed to enter these areas without the proper qualifications, equipment and training.
- ❑ It is the sole responsibility of the contractor to coordinate entry into any confined space. The contractor shall notify the COTR prior to entering a confined space.
- ❑ Anyone entering a permit-required confined space must follow OSHA regulations, 29 CFR 1910.120.

Contractor's Impact

System	Possible Interruption	Possible Effect to Patients
Electrical	<ul style="list-style-type: none"> - Changing position of switches and breakers - Cutting or splicing into wires - Disconnecting wires or terminals - Disturbing Junction Boxes/Electrical Panels - Core Drilling - Demolition of walls - Excavation 	Electrical Systems provides LIFE SUPPORT (Directly and Indirectly) <ul style="list-style-type: none"> - Can cause DEATH to critical patients
Water Lines	<ul style="list-style-type: none"> - Turning valves - Cutting into lines - Demolition & Excavation 	Dialysis, OR, HVAC, ICU, X Ray, etc Can cause DEATH to critical patients Infection Control issues Major Cleanup issues
Medical Gases: Oxygen Air Vacuum	<ul style="list-style-type: none"> - Cutting or disturbing into lines (labeled, unlabeled) - Changing valve positions - Deactivating alarms 	Oxygen, vacuum, air, etc. ICU, OR, Med/Surg. Can cause DEATH to critical patients

Nitrous Oxide Nitrogen	- Demolition & Excavation	
HVAC	- Shutting down - Modifying - Changing controls - Cutting into the roof - Producing foul odors near intakes - Cutting into chilled water lines - Obstruct fresh air intake	Temperature is critical in OR, ICU, etc. Infection Control issues Major Air Quality Issues
Fire Alarm and Sprinklers	- ANY modifications - covering or removing smoke heads - Demolition & Excavation - Damage or set off sprinkler heads - Duct work modifications	- Compromising Fire Safety - False Alarms - Floods - Major disruptions and distractions ALL THE ABOVE CAN RESULT IN DEATH
Code Alarms Nurse Call Wander Guards	- Demolition & Excavation - Unplugging - Changing position of switches/breakers	Lack of communicating system can result in patient death or injury

Contractor Room/Space

- ☐ Materials will be kept on the job site in the contractors' room or in storage space provided for the contractor by the COTR.
- ☐ Any shared space within the storage room(s) must be accessible to the COTR, Police, and Fire Department.
- ☐ Corridors are not to be used for storage.
- ☐ Contractors will manage the signed space and assure the site is kept clean and safe. Refer to OSHA standards.
- ☐ Any disputes or concerns will be directed to the COTR.

Damage by Contractors

- ☐ Any damage caused by the contractor's employees is to be reported to the COTR immediately.

Deliveries

- ☐ All material deliveries at the loading dock must be coordinated with the COTR. Deliveries of material and equipment are to be made at times when the contractor or subcontractor is available to accept them. The VA will not be responsible for receiving or storing items, and warehouse personnel will not allow deliveries to be unloaded.
- ☐ In order to minimize delays and interferences, large deliveries must occur Monday through Friday after 7:30 a.m. and before 2:30 p.m. Weekend and after hours deliveries need to be prearranged with the COTR.

Dress Code

- ☐ All personnel must be appropriately dressed for their work. T-shirts or garments with obscene or suggestive messages are not permitted. Personnel found improperly dressed will be asked to leave the facility.

Dust Barriers and Ventilation Requirements

- ☐ All dust barriers will be coordinated with the COTR before installation.
- ☐ Dust barriers are needed to protect occupied areas on any portion of the construction project that has the potential to generate dust.
- ☐ The barriers must be smoke resistive and non-combustible. When barriers are part of a smoke or fire barrier, the construction barriers must be equivalent.

Emergency Preparedness Notification

- ❑ Contractors are to post the “VA Emergency Guidebook” in a conspicuous spot for all construction personnel to review. Construction personnel are to be trained on the postings prior to beginning work and as the project progresses.
- ❑ The guidebook lists all emergency phone number and explains what to do in the case of an emergency. Such as; bomb threat, workplace injuries, emergency preparedness, hazardous materials & spills, tornado procedures, fire plan, and utility & equipment failures. A copy of the guidebook is available from the COTR.

Elevator Usage

- ❑ Contractors shall not hold or block from use any public elevators in any building unless authorized by the COTR.
- ❑ The COTR will define which elevators shall be used and the times for moving materials and waste to and from the site(s).

Equipment Safety

- ❑ Ladders are not to be left unattended in public areas during breaks and lunch hours. Ladders shall be laid down and placed out of the traffic areas during these periods.
- ❑ No tools, carts, ladders or other equipment are to be left unattended outside a secured area.
- ❑ Yellow safety barricades must be used when working in public areas.
- ❑ Use of hospital equipment is not permitted.

Equipment and Supplies

- ❑ Caution must be used with all flammable materials, i.e., adhesives, thinners, varnishes, etc.
- ❑ All paint shall be low odor latex paint. The contractor will use odor reducing agents in all paints and solvents. Ventilation will be required if toxic or foul smelling materials have to be applied.
- ❑ Only a one-day supply of paints, materials and gas cylinders is permitted outside an approved storage area.

Fire Alarm System

- ❑ Care must be exercised to prevent the accidental tripping of smoke detectors and fire alarms.
- ❑ Notify the COTR of your activities and location while performing work in the hospital.
- ❑ Cover and protect the smoke alarms when raising dust or creating smoke. Remove plastic bags around smoke detectors upon completion of the work and at the end of each workday.
- ❑ Notify the COTR immediately if the alarm is tripped.

Hazardous Materials and Waste

- ❑ A listing of all hazardous materials that will be used on the job and their material safety data sheets (MSDS) will be available on site for COTR review.
- ❑ Ant excess or used chemicals will be removed from the hospital promptly and properly disposed of by the contractor in accordance with federal, state and local regulations.
- ❑ Do not store excessive amounts of flammable or combustible materials on the job site. A safe location to store these materials will be provided by the COTR.

Heavy Lifting

- ❑ Hoisting heavy materials/items require prior review by the COTR.

Hospital Fire Plan R-A-C-E

- ❑ Fire Plan - There is no difference between a fire drill and an actual fire.
- ❑ Make sure you know where the pull stations are in the areas you are working.
- ❑ If you are in the area of the fire:
 - R** Rescue anyone from the area if necessary
 - A** Activate/Pull the nearest Pull Station
 - C** Contain the fire by closing all doors in the area
 - E** Extinguish if possible or Evacuate the area immediately
- ❑ If you are NOT in the area of the fire:
 - Construction Workers are to cease activities, stay in place, and wait for further instructions or cancellation of the fire drill.
 - DO NOT move through the hospital. DO NOT use the elevators or stairwells.

Housekeeping

- ❑ Housekeeping in public areas of the hospital will be maintained at the highest level, even while work is on going.
- ❑ In secured areas, housekeeping will be performed as needed, but at a minimum at the end of each day.

Hot Work Permits

- ❑ Before any cutting, soldering, grinding, welding, etc., is conducted, the contractor or sub-contractor shall obtain permission through a hot work permit. The contractor shall be responsible for obtaining the hot work permits from the COTR.
- ❑ Gas and oxygen canisters shall be properly chained and protected and two 10 – pound fire extinguishers shall be present.
- ❑ The contractor shall maintain a fire watch during the hot work operations, and 30 minutes after the hot work is completed.

Identification Badges

- ❑ The construction personnel will not be required to wear identification badges at this time.

Infection Control

- ❑ Prior to all construction activities, infection control procedures must be review and approved by the COTR.
- ❑ The construction personnel are to read and follow the directions listed on any Infection Control Precaution sheet posted outside a patient's room. Generally this means permission must be obtained from the nursing staff before entry.
- ❑ Temporary walls or dust barriers are required to enclose areas under construction.
- ❑ Under some conditions it may be necessary to block return and supply ducts. There shall be no re-circulation of air from a construction areas that will generate dust, smoke or odors to other parts of the hospital.
- ❑ Tack pads must be located entrances and exits to the construction area.
- ❑ Contractor shall promptly remove any dust tracked outside of construction barriers.
- ❑ As a standard precaution assume that any person may carry contagious disease. In order to protect you from these diseases always assume blood; non-intact skin, mucous membranes and other body fluids and excretions are infectious. Do not touch any such materials but contact the COTR immediately. Needle container boxes are provided for the disposal of syringes and other sharps used in the medical center. These must be properly removed and disposed of by hospital personnel.

Interim Life Safety

- ❑ The hospital will document whether and to what extent Interim Life Safety Measures (ILSM) will be implemented for each project.
- ❑ Any life safety code violations incurred during construction or renovation will result in close coordination with COTR to implement the hospital's Interim Life Safety Measures. JCAHO and NFPA require these measures.
- ❑ The Contractor in cooperation with the COTR will ensure ILSMs are employed to temporarily compensate for hazards posed by existing Life Safety Code (LSC) deficiencies or construction activities.
- ❑ ILSMs apply to both construction and hospital employees.
- ❑ ILSMs will require increased walkthrough inspections by the superintendent/foreman, COTR and Safety Officer.
- ❑ Training of construction workers and hospital staff will always be a significant part of ILSM procedure. The contractor, COTR and Safety Official all share responsibility to make sure everyone under increased risk is made aware of the risk and compensating ILSMs.

Life Safety

- ❑ Temporary construction partitions of non-combustible materials shall be installed as required to provide a smoke tight separation between the areas undergoing renovation and/or construction and adjoining areas that are occupied by the facility.
- ❑ Exits for occupied areas of the building including rooms, suites, corridors and floors shall not be blocked by the construction or by construction materials. Exit may be blocked temporarily if it is unavoidable and adequate alternative measures are provided, such as signage, instructions to occupants and approved by the COTR.
- ❑ Existing fire protection systems including fire alarm systems, smoke detection systems, and sprinkler systems shall not be altered except as required for the alteration and/or renovation project. Any alteration to the system shall be coordinated with COTR
- ❑ It is the responsibility of each contractor to know exactly where the fire extinguishers and pull stations are in the work area.
- ❑ Fire hazard inspections shall be conducted daily by the contractor once construction starts and until the work is turned back over to the facility.
- ❑ All temporary electrical wiring and equipment used for construction shall be installed and used in accordance with pertinent provisions of NFPA 70 and National Electrical Code.
- ❑ Maintain construction site to permit access to fire department as necessary. Clear building construction areas of obstructions so that all portions are accessible for fire department apparatus and permit emergency egress of patients and other personnel.

Lockout/Tag out

- ❑ Lock Out/Tag Out - No contract workers is allowed to change the status/position of ANY switch, valve or any other energy source without prior approval from the COTR. All Lock out/Tag out activities need prior approval before implementation. Any activity requiring a Lockout/Tag out process must comply with the hospital policy.
- ❑ All contractors shall comply with OSHA Regulation 29 CFR 1910.147 on Lockout/Tag out procedures.
- ❑ Only VA personnel are authorized to shutdown hospital equipment or utilities unless permission is specifically granted.

Material Safety Data Sheets (MSDS)

- ❑ MSDS must be provided for any hazardous materials that will be used on VA property.
- ❑ MSDS are available for all materials used in the hospital. Contact the COTR for all hospital MSDSs.

Noise

- ❑ All core drilling, chipping and hole drilling shall be done at a time and day determined by the COTR in consultation with occupants of the space and adjacent areas.
- ❑ Patients, visitors and staff deserve consideration and the quiet enjoyment of their premises. Anyone found being loud, rude or otherwise annoying to the patients, their guests or hospital staff would be asked to leave the hospital.
- ❑ All work activity within occupied portions of the hospital shall be accomplished with minimal disruption to the patients, physicians, visitors and staff.
- ❑ Playing of radios, tapes and CD players is not permitted in any occupied area. "Walkman" radios/tapes and CD players are not permitted anywhere in the hospital.
- ❑ The playing of radios, tapes and CD players are permitted in vacant areas but shall not be heard outside the vacant area.

OSHA Compliance

- ❑ All contractors are subject to Occupational Safety and Health Administration (OSHA) regulations. The contractor is expected to enforce and comply with these standards in the performance of their work. OSHA regulations can be found in Chapter 29 of the Code of Federal Regulations (CFR). Failure on the part of any contractor or their employee to comply with these standards and/or conduct their work in a safe fashion will result in an interruption in the work schedule for which the contractor will be solely responsible.

Parking

- ❑ COTR will designate contractor employee parking areas. Contractors may not block fire lanes or other roadways.
- ❑ Contractor to coordinate parking and obtain parking permits from the COTR.

Patient/Visitor Privacy

- ❑ No construction personnel are allowed to review, acknowledge or move any patient information or records.

Personal Protective Equipment

- ❑ There are many situations that require specific personal protective equipment for worker safety according to OSHA. It is the responsibility of the individual contractor to know when it is to be used and is responsible to wear them.

Posting and Training

- ❑ The field superintendents/foremen are to post the following hospital specific documents for all construction employees to read; Construction Commandments, VA Emergency Guidebook and Hospital Smoking Policy.
- ❑ Each field superintendent/foreman is responsible for construction personnel working under his/her supervision. This person shall make sure each employee working on the site has been trained on the Construction Commandments; as well as, other posted information.

Restroom Usage

- ❑ Construction personnel shall use the public restrooms and shall not use restrooms in occupied areas.

Request for Information

- ☐ All request for assistance, coordination and information shall be done through the COTR.
- ☐ Address: COTR (Engineering Service)
Edward Hines Jr. VA Hospital
5th & Roosevelt Roads
Hines, IL 60141
- ☐ Phone No. (708)202-8387, ext. 21145
- ☐ Fax No. (708)202-2167

Safety Regulations

- ☐ Contractors are expected to comply with all Occupational Safety and Health Administration (OSHA) regulation, 29 CFR 1926 and 1910.
- ☐ Appropriate job signs and barriers are in place to prevent occupants from straying into the construction area.
- ☐ Stairwell doors can not be propped open or blocked at any time. Equipment cannot be stored in the stairwells.
- ☐ All contractors shall close doors to construction area. All doors shall be locked when not under contractor direct supervision.
- ☐ All contractors are encouraged to frequently review these guidelines with their employees and subcontractors on site (e.g., during weekly ToolBox Safety Meetings).
- ☐ All contractors and their subcontractors are responsible for complying with these guidelines, specification section 01010, and OSHA rules and regulations.

Security of Construction Areas

- ☐ Before beginning work on a project, all contractors shall check in with the COTR. The contractor will supply the following information: scope of work, authorization, duration, and any pertinent information that is required.
- ☐ Contractor to use VA supplied locks; cylinders and keys allowing access to the construction area.
- ☐ The COTR, Facilities Engineering, Safety Office and Police must have be able to access the construction area as needed to perform their assigned responsibilities.
- ☐ Two evacuation routes from the worksite must be maintained at all times.
- ☐ Contractors may lock up their personnel tools, etc., with personal locks.

Shutdowns/Connections to Utilities and Building Systems

- ☐ All connections, tie-ins, or alterations to the building life safety components and utility systems must be performed with COTR coordination and approval at least three week prior to the date requested.

Smoking

- ☐ The Smoking policy of the hospital is no smoking within 50 feet of the building and only in areas designated for smoking. All construction employees must comply with this policy. Any construction employee not complying with this policy will be asked to leave the facility grounds for the duration of the project.
- ☐ Construction superintendents/foremen are expected to enforce this smoking policy.

Stop Work

- ☐ The hospital safety officer and the COTR have the Director's authorization to stop work whenever conditions pose an imminent threat to life and health or threaten damage to equipment or buildings.

Subcontractors

- ☐ The general contractor is responsible for obtaining and submitting signed “Field Supervisors/Foremen Agreement” from each of subcontractors working in the hospital. A subcontractor will not be paid until the COTR has received the signed agreements.
- ☐ The COTR reserves the right to reject any subcontractor proposed or working on a project for just cause.
- ☐ An on-site construction employee must be designated “In Charge” at all times the contractor is on site.

Traffic Control

- ☐ Contractor shall provide trained personnel and equipment, signage, barricades, etc., to regulate traffic whenever construction operations affect traffic patterns.

Trenching and Digging

- ☐ OSHA regulations must be followed during trenching operations.

Waste

- ☐ Trash, combustible waste and excess construction materials must be removed daily to prevent accumulation. Contractors must arrange for the removal of their debris and waste with the COTR.
- ☐ Contractor shall use their Dumpster. Coordinate dumpster location with the COTR.
- ☐ The contractor is encouraged to contact and utilize the hospital’s recycling program for the disposal of recyclables.
- ☐ The contractor is expected to comply with all environmental regulations.

Wall and Floor Penetrations

- ☐ Prior to making any penetrations in walls, floors or ceilings, it is the contractor’s responsibility to identify fire and smoke rated systems.
- ☐ The contractor shall have the COTR inspect and approve all floor and wall penetration.
- ☐ All wall and floor penetrations must be located, marked and sealed by the contractor responsible for the penetration.
- ☐ All repaired penetrations on rated systems must be completed using a fire rated material matching the rating of the system and must be inspected by the COTR before ceiling tiles are replaced or area is concealed.

IF THERE IS ANY QUESTION REGARDING ANY OF THE INFORMATION ON THIS DOCUMENT, IMMEDIATELY CONTACT THE COTR TO RESOLVE ISSUES PRIOR TO WORK COMMENCEMENT.

Company:_____

Receipt Acknowledged:_____

Signature:_____

Date:_____

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section specifies requirements for project meetings related to management, administration, procedure and quality assurance of the Work, including but not limited to, following:
1. Pre-construction project meetings.
 2. Progress project meetings.
 3. Pre-installation project meetings.
 4. Specially called project meetings throughout progress of the Work.

1.2 RESPONSIBILITIES

- A. Meeting scheduling and administration is responsibility of Contractor.
- B. Schedule and administer project meetings.
1. Prepare agendas.
 2. Distribute written notice and agendas of regular and specially called project meetings 4 days in advance of meeting date.
 3. Make physical arrangements for project meetings.
 4. Preside at meetings.
 5. Record minutes and include significant proceedings and decisions.
 6. Distribute copies of minutes within 3 days after each meeting:
 - a. To all participants in meeting.
 - b. To all parties affected by decisions made at meeting.
 - c. Furnish 3 copies of minutes each to Contracting Officer's Technical Representative and Architect.
- C. Representatives of contractors, subcontractors and suppliers attending project meetings shall be qualified and authorized to act on behalf of entity each represents.
- D. Architect will attend project meetings to ascertain that the Work is consistent with Contract Documents.

1.3 PRE-CONSTRUCTION MEETING

- A. Time: Schedule within 14 days after date of commencement of the Work established in the Contract Documents.
- B. Location: Project site field office of Contractor, except as otherwise designated in meeting notice.

C. Attendance:

1. Contracting Officer's Technical Representative and his/her professional consultants as needed, including Quality Control Service professional engineer, if applicable.
2. Architect and Architect's professional consultants as needed.
3. Other separate contractors as pertinent to agenda.
4. Major subcontractors.
5. Major suppliers.
6. Representatives of governmental or other regulatory agencies as pertinent to agenda.

D. Minimum Agenda:

1. Distribution and Discussion of:
 - a. List of major subcontractors and suppliers.
 - b. Progress schedule.
2. Critical work sequencing.
3. Major product deliveries and priorities.
4. Work Coordination:
 - a. Relation and coordination with separate contractors.
 - b. Relation and coordination of subcontractors.
 - c. Designation of responsible personnel.
5. Procedures and Processing of:
 - a. Field decisions.
 - b. Proposal requests.
 - c. Proposed substitutions.
 - d. Submittals.
 - e. Change orders.
 - f. Application for payment.
6. Adequacy of distribution of Contract Documents.
7. Procedures for maintaining record documents.
8. Use of Premises:
 - a. Access to project site.
 - b. Office, work and storage areas.
 - c. VA requirements.
9. Temporary facilities, controls and construction aids.
10. Temporary utilities.
11. Security procedures.
12. Housekeeping procedures.
13. Project site geotechnical conditions and earthwork procedures.

1.4 PROGRESS PROJECT MEETINGS

A. Time:

1. Schedule regular periodic project meetings as required by operations or as required by Contracting Officer's Technical Representative, but not less than every 14 days, except as otherwise required.
2. Hold specially called project meetings as required by work operation, progress of the Work or as required by Contracting Officer's Technical Representative.

B. Location: Project site field office of Contractor, except as otherwise designated in meeting notice.

C. Attendance:

1. Contracting Officer's Technical Representative as needed or as pertinent to agenda.
2. Architect and Architect's professional consultants as needed or as pertinent to agenda.2. Other separate contractors as needed or as pertinent to agenda.
3. Subcontractors as pertinent to agenda.
4. Suppliers as pertinent to agenda.
5. Representatives of governmental or other regulatory agencies as pertinent to agenda.

D. Minimum Agenda:

1. Review and acceptance of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Note project site observations, problems and decisions.
4. Problems which impede planned progress.
5. Review off-site fabrication and delivery problems and schedules.
6. Develop corrective measures and procedures to regain projected progress schedule.
7. Revisions to progress schedule as required.
8. Plan progress for succeeding work period.
9. Coordinate projected progress with separate contractors as needed.
10. Review submittals schedules, expedite as required to maintain project progress schedule.
11. Maintaining of quality standards.
12. Review proposed changes for:
 - a. Effect on progress schedule.
 - b. Effect on completion date.
 - c. Effect on separate contracts of Project.
13. Other business.

1.5 PRE-INSTALLATION PROJECT MEETINGS

- A. Time: Schedule 7 days minimum prior to installation of each unit of work which requires coordination with other work or as otherwise specified in individual specification sections.
- B. Location: Project site field office of Contractor, except as otherwise designated in meeting notice.
- C. Attendance:
 - 1. Contracting Officer's Technical Representative as needed or as pertinent to agenda.
 - 2. Architect and Architect's professional consultants as needed or as pertinent to agenda.
 - 3. Other separate contractors as needed or as pertinent to agenda.
 - 4. Subcontractors and installers as pertinent to agenda.
 - 5. Manufacturers and fabricators as pertinent to agenda.
 - 6. Suppliers as pertinent to agenda.
- D. Minimum Agenda: Review conditions associated with performing unit of work, preparations for particular work and progress of other work, including specific requirements for following:
 - 1. Contract Documents.
 - 2. Options.
 - 3. Related change orders.
 - 4. Purchases.
 - 5. Deliveries.
 - 6. Submittals, including shop drawings, product data and samples.
 - 7. Possible conflicts and compatibility problems.
 - 8. Time schedules.
 - 9. Weather limitations.
 - 10. Instructions and recommendations of manufacturer.
 - 11. Compatibility of materials.
 - 12. Acceptability of substrates.
 - 13. Temporary facilities.
 - 14. Space and access limitations.
 - 15. Governing regulations.
 - 16. Inspection and testing requirements.
 - 17. Required performance results.
 - 18. Recording requirements.
 - 19. Protection.

E. Responsibilities:

1. Minutes: Record significant discussions of each conference, and record agreements and disagreements, along with final plan of action.
2. Action: Do not proceed with the Work if pre-installation meeting cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene pre-installation meeting at earliest feasible date.

- - - END - - -

SECTION 01 32 16.15
PROJECT SCHEDULES
(SMALL PROJECTS - DESIGN/BID/BUILD)

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 Contracting Officer's Technical Representative (COTR).
- 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. If an outside scheduling consultant is utilized, Section, CONTRACTOR'S CONSULTANT of this specification will apply.

1.3 CONTRACTOR'S CONSULTANT:

- A. The Contractor shall submit a qualification proposal to the Contracting Officer's Technical Representative (COTR), within 10 days of bid acceptance. The qualification proposal shall include:
 - 1. The name and address of the proposed consultant.
 - 2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
 - 3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.

- B. The Contracting Officer has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of the qualification proposal. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

1.4 COMPUTER PRODUCED SCHEDULES

- A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), 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 Contracting Officer's Technical Representative (COTR) 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 diskette(s), when requested by the Contracting Officer's representative, to correct errors which affect the payment and schedule for the project.

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three copies of the interim schedule on sheets of paper 765 x 1070 mm (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 blue 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.

- E. 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.
- F. The Complete Project Schedule shall contain sufficient work activities/events to document work to be performed.

1.6 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.
- A1 B. (Deleted)
- 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 ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.7 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.

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- b. Contracting Officer's review and approval and Architect-Engineer's acceptance of shop drawings, equipment schedules, samples, template, or similar items.
 - c. Interruption of VA Facilities utilities, delivery of 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 curing) and any other activities/events for which the Contracting Officer's Technical Representative (COTR) 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 per shift.

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.

- C. 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 Contracting Officer's Technical Representative (COTR). Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the Contracting Officer's Technical Representative's (COTR's) approval of the Project Schedule.
- D. 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.

1.8 PAYMENT TO THE CONTRACTOR:

- A. Monthly, the contractor shall submit the AIA application and certificate for payment Documents G702 and 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) of the General Conditions. 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.

1.9 PAYMENT AND PROGRESS REPORTING

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the Contracting Officer's Technical Representative (COTR) 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 Contracting Officer's Technical

Representative (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 Contracting Officer's Technical Representative 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 Contracting Officer's Technical Representative. 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, COMPUTER PRODUCED SCHEDULES and PROJECT SCHEDULE REQUIREMENTS, of this Section. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the Contracting Officer's Technical Representative within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the**

reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.

- D. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, Contracting Officer's Technical Representative, office representatives, and all subcontractors needed, as determined by the Contracting Officer's Technical Representative, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

1.10 RESPONSIBILITY FOR COMPLETION

- A. 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 Contracting Officer's Technical Representative (COTR) 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.

1.11 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.
- A1 B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for 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 VA representative.
- 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 VAAR 852.236 - 88 (Changes - Supplemental) of the General Conditions, 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.

1.12 ADJUSTMENT OF CONTRACT COMPLETION

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion

date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the Contracting Officer's Technical Representative (COTR) 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) and VAAR 852.236 - 88 (Changes - Supplemental) of the General Conditions. 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.

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

- 1.1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- 1.2. For the purposes of this Contract, samples including laboratory samples to be tested, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1.3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with Contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
 - A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item.
 - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity.
 - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- 1.4 Substitutions: Meet Requirements of this Section and Section 01 63 00 - Substitutions for proposals for Substitutions made after award of Contract.
- 1.5. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of Contract - required items. Delays attributable to untimely and rejected submittals including any laboratory samples to be tested will not serve as a basis for extending Contract time for completion.
- 1.6. Submittals will be reviewed for compliance with Contract requirements by Architect, and action thereon will be taken by Contracting Officer's Technical Representative on behalf of the Contracting Officer.

- 1.7. Upon receipt of submittals, Architect will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.
- 1.8. Submittal File Number: Contractor shall provide a file number on each submittal item (not a group of submittal items) to be submitted and on respective submittal transmittal. File number shall consist of applicable specification section number and a continuous sequenced numbering system for each section, thus, 033000-1, 033000-2; 033000-3 and 033000-4. File numbers shall appear in lower right hand corner of each page, sheet, tag or label of each submittal.
- 1.9. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this Contract. If additional submittals beyond those required by the Contract are furnished pursuant to request therefor by Contracting Officer, adjustment in Contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.
- 1.10. Schedules called for in Specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1.11. Submittals must be submitted by Contractor only. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
 - A. Submit samples in quadruplicate unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates electronically as portable document files (PDF) through Newforma, or equal electronic system, as acceptable to Architect and Contracting Officer's Technical Representative.

- B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail for samples, and included in all electronic submittals; and shall contain the list of items, name of Medical Center, name and address of Contractor, Contract number, date of submission and date of any previous submission, project title and number, submittal file number, quantity and identification number, title and latest date of each shop drawing, product data, sample or like submittal submitted; identification of product with specification section number and title reference, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished, and other pertinent data. In addition, catalogs shall be marked to indicate specific items submitted for approval.
1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
 2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, date of submission and date of any previous submissions, project title and number, submittal file number, names of Contractor, subcontractor, supplier and manufacturer, brand, identification of product with specification section number and title reference, clearly identified field dimensions, relation to adjacent structure or critical features of the Work or materials, ASTM or Federal Specification Number as applicable and location(s) on project, identification of deviations from Contract Documents, blank space or securely attached tag or sticker for stamps of Contractor and Architect.
 3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.

C. In addition to complying with the applicable requirements specified in other Articles of this Section, samples which are required to have laboratory tests shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.

1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.
2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
4. Contractor shall send a copy of transmittal letter to both Contracting Officer's Technical Representative and to Architect simultaneously with submission of material to a commercial testing laboratory.
5. Laboratory test reports shall be sent directly to Contracting Officer's Technical Representative for appropriate action.
6. Laboratory reports shall list Contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.
8. Inspection and test reports shall identify extent of area in Project represented by inspection or test of product or work, identification of methods, procedures and results of inspections or tests, including observations of unusual conditions, and identification of results and acceptability and use limitations.

D. Resubmittals:

1. Resubmittal File Number: For resubmittals, Contractor shall maintain same submittal file number on each submittal item to be resubmitted and on respective resubmittal transmittal as required for initial submission, except add a continuous sequenced resubmission number, thus, 033000-1 (R1), 033000-1 (R2) and 033000-1 (R3). File numbers shall appear in lower right hand corner of each page, sheet, tag or label of each resubmittal.

2. Specifically indicate on shop drawings any changes which have been made on resubmittals, other than those noted by Architect on previous submittals.
 3. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- E. Approved samples will be kept on file by the Contracting Officer's Technical Representative at the site until completion of Contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in Contract Work. At completion of Contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the Contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of Contract.
- F. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with Contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
1. For each drawing required, submit as full size PDF.
 2. Reproducible shall be full size.
 3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to Contract drawing number, detail Section Number, and Specification Section Number.
 4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
 5. Submit drawings, electronically as described in Paragraph 1.11 of this Section.
 6. PDFs of approved or disapproved shop drawings will be forwarded to Contractor electronically.
 7. Certification: When required, shop drawings shall be certified by product manufacturer or fabricator. Certified shop drawings shall meet requirements of this Section.

8. When work is directly related and involves more than one trade, shop drawings shall be submitted under one cover.
- G. Product data shall be submitted with each copy clearly marked to identify pertinent materials, products or models. Show performance characteristics and capacities, dimensions, tolerances and clearances required; total weight or operating weight, whichever is greater; reaction stress to be supported by the supporting structure as applicable; and operation and control diagrams as applicable. Also provide standard schematic drawings and diagrams of manufacturer, with information that is not applicable to work deleted, and with standard information supplemented with additional information applicable to the Work.
- 1.12 Compliance certificates shall be affidavits specifically prepared for the Work by Contractor or a subcontractor, sub-subcontractor, manufacturer, supplier, distributor or independent quality control service attesting a product or portion of the Work will be or is in compliance with requirements of Contract Documents.
- A. Qualification: Each compliance certificate shall be original copy. Photocopies or other reproductions are not acceptable.
- B. Presentation: One compliance certificate shall cover a single product or portion of the Work. Certificates shall identify products or work by identification designations indicated by Contract Documents.
- C. Data Included: Compliance certificates shall include references to specific product or work specifications or performance requirements indicated by Contract Documents.
- D. Certification: Compliance certificates shall be certified by person authorized to sign such document for issuing organization. Certified compliance certificates shall meet requirements of this Section.
- 1.13 Certified submittals are submittals required to be certified shall bear affidavit attesting product or work indicated by submittal will be, shall be or has been furnished or provided for the Work as indicated by such submittal, and meets requirements of Contract Documents. Certified submittals shall meet requirements for respective type submittal.
- A. Presentation: Affidavit shall be dated and bear signature of person authorized to sign such document for issuing organization. Include attestation of issuing organization for person authorized to sign such affidavit.
- B. Data Included: Certified submittals shall include data required for respective type submittal.

1.14 In addition to other responsibilities specified in this Section, Contractor responsibilities shall be as follows:

- A. Reviewing submittals prior to submission to Architect.
- B. Contractor shall be responsible for:
 - 1. Compliance with Contract Documents.
 - 2. Confirming catalog numbers and similar data.
 - 3. Confirming and correlating quantities which may be indicated on submittals or required for the Work.
 - 4. Confirming and correlating dimensions which may be indicated on submittals or required for the Work, and measurements at project site.
 - 5. Information and selection that pertains to fabrication and construction means, methods, techniques, sequences and procedures, and safety and health precautions and programs.
 - 6. Coordination of the Work represented by each submittal with requirements of all other work related thereto, including requirements of Contract Documents, the Work and Project.
 - 7. Performing the Work in a safe, healthy and satisfactory manner.
 - 8. Compliance with progress schedule and subschedules.
 - 9. All other provisions of Contract Documents.
- C. Contractor responsibility for errors and omissions in submittals from requirements of Contract Documents is not relieved by review of submittals by Architect.
- D. Contractor responsibility for deviations in submittals from requirements of Contract Documents is not relieved by review of submittals by Architect, except if written acceptance of specific deviation is given.
- E. Notify Architect in writing by letter at time of submission which is acknowledged by Architect in writing, of any deviation in submittals from requirements of Contract Documents.
- F. Begin no work, including ordering or purchasing of materials and products, which requires submittals until all required submittal and review procedures have been fulfilled and until return of submittals bearing stamp and signature of Architect indicating review and acceptable action taken.
- G. Do not use submittals which are required for the Work that do not bear stamp and signature of Architect indicating review and acceptable action taken.

- H. Notation of Architect on submittals is not to be construed as an authorization for additional work, additional cost or additional time to complete the Work.
- I. If any notation represents a change to Contract Sum or Contract Time, submit a proposal for change in accordance with procedures indicated by Contract Documents, before proceeding with work.
- J. Notation of Architect on submittal is not to be construed as acceptance of visual characteristics, including colors, patterns, textures or sheen. Make all such related submittals at one time.
- K. Notify Architect by letter of any notations made by Architect which Contractor finds unacceptable. Resolve such issues prior to proceeding with work.
- L. Do not submit submittals representing work for which such submittals are not required. Any shop drawing, product data, sample or like submittal representing work for which submittal is not required will be returned not reviewed by Architect. Architect will not be responsible for consequences of inadvertent review of non-required submittals.

1.15 Architect duties shall be as follows:

- A. General: Except for submittals for record, information or similar purpose only, Architect will:
 - 1. Review only for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents prepared by Architect.
 - 2. Review is not conducted for purpose of determining accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of products, all of which remain responsibility of Contractor as required by Contract Documents.
 - 3. When professional certification or performance characteristics of products systems, or work is required by Contract Documents and such certification is specifically required to be provided by a properly licensed design professional in jurisdiction where the Work is located, other than the Architect, then signature and seal of such design professional shall appear on all related submittals. The Owner and Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services or certifications performed by such design professional, including that the products, systems or work will meet performance requirements and design criteria indicated by Contract Documents.

4. Review, including comments or variations made on submittals, shall not relieve Contractor of obligations under Contract Documents.
 5. Review shall not constitute review or acceptance of any fabrication and construction means, methods, techniques, sequences and procedures, and safety and health precautions and programs.
 6. Review of separate or specific item shall not indicate or constitute review of an assembly of which item is a component.
 7. Affix submittal review stamp of Architect, action taken and initials or signature of reviewer, certifying to review of submittal.
 8. Return submittals to Contractor for distribution or for revision and resubmission.
- B. Submittal Review Stamp: Action notations on submittal review stamp of Architect mean following:
1. REVIEWED (ACTION A) means no deviations from information given and design concept expressed in Contract Documents have been found. Resubmittal not required.
 2. REVIEWED WITH COMMENTS (ACTION B) means deviations from information given and design concept expressed in Contract Documents which have been found are noted. Resubmittal not required, except when otherwise indicated by submittal review stamp of Architect.
 3. REVIEWED MUST RESUBMIT (ACTION C) means deviations from information given and design concept expressed in Contract Documents which have been found are noted. Revise and resubmit submittal for review until no further resubmission is required.
 4. (ACTION D) means to take appropriate action upon notation of Architect marked on returned submittal, and deviations from information given and design concept expressed in Contract Documents which have been found are noted.
 - a. If applicable, revise and resubmit submittal for review in compliance with notations of Architect marked on returned submittal and requirements of Contract Documents. Resubmit submittal for review until no further resubmission is required.
 - b. If applicable, revise and forward submittal for record in compliance with notations of Architect marked on returned submittal and requirements of Contract Documents.

- 1.16 Samples (except laboratory samples), shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for review to:

A. Epstein and Sons International, Inc. - c/o Brandy Kardys.

(Architect-Engineer)

600 West Fulton Street

(A/E P.O. Address)

Chicago, Illinois 60661-1259

(City, State and Zip Code)

- 1.17 At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the Contracting Officer's Technical Representative.

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SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section identifies building codes and other regulatory requirements applicable to the Work. Listing of regulatory requirements is not necessarily complete, but nevertheless meet requirements of all laws, statutes, ordinances, building codes, rules and regulations of public authorities and others bearing on performance of the Work. This Section also specifies certain requirements for the Work relative to regulatory requirements.

1.2 RELATED WORK

- A. Conditions of the Contract provisions relative to regulatory requirements.
- B. Regulatory requirements applicable to specific parts of the Work.

1.3 QUALITY ASSURANCE

- A. Application:
1. General: Perform and complete the Work to meet regulatory requirements, except to extent more detailed or stringent requirements are required by Contract Documents.
 2. Conflicts:
 - a. General: Where 2 or more regulatory requirements apply to same requirement for the Work, meet most stringent regulatory requirement. Refer uncertain instances or where determinations or interpretations are not self-evident to Architect in writing for clarification.
 - b. VA Conflicts: Where conflicts occur between Veterans of Affairs nationally recognized codes and standards, and Department of Veterans Affairs Requirements, refer conflict in writing to the Department of Veterans Affairs and the Architect. Resolution shall be made by authority having jurisdiction over the work for the Department of Veterans Affairs to ensure system wide consistency.
- B. Copies: Copies of regulatory requirements are not included with Contract Documents, but are nevertheless in full force and effect for the Work. Obtain copies of regulatory requirements directly from publication sources.

- C. Effective Date: Meet regulatory requirements of latest date, edition, amendment or revision in effect at date of Contract Documents, except where indicated to meet regulatory requirements of a specific date, edition, amendment or revision.

1.4 REGULATORY REQUIREMENTS SCHEDULE

A. Department of Veterans Affairs:

1. VA Directives.
2. VA Design Manuals.
3. VA Master Construction Specifications
4. VA National CAD Standard Application Guide.
5. Manual for Preparation of Cost Estimates for VA Facilities.
6. VA Space Planning Criteria PG-18-0.
7. A/E Submission Instructions for Minor and NRM Construction Program PG-18-15 Volume C.
8. VA Design & Construction Procedures PG-18-3.
9. Other Guidance on the Technical Information Library (TIL).

B. ACI - American Concrete Institute:

1. ACI 318 - 2R, Commentary.

C. ADA - American with Disabilities Act.

D. Energy Code for New Federal Commercial, and Multi-Family High Rise Residential Buildings, Final Rule, Mandatory for New Federal Buildings, Department of Energy Regulations, 10 Code of Federal Regulations (CFR) Parts 434 and 435.

E. Greening the Government through Efficient Energy Management, Executive Order 13123.

F. Greening the Government through Leadership in Environmental Management, Executive Order 13148.

G. IBC - International Building Code.

H. OSHA - Occupational, Safety and Health Administration (OSHA) Standards.

I. NEC - National Electric Code.

J. NFPA - National Fire Protection Association (NFPA) Codes, with the exception of NFPA 5000 and NFPA 900.

K. The Provisions for Construction and Safety Signs (stated in Section 010000, GENERAL REQUIREMENTS of the Department of Veterans Affairs Master Specifications.

L. UFAS - Uniform Federal Accessibility Standards, including VA Supplement, Barrier Free Design.

M. U.S. National CAD Standard.

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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)

- A. 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 http://www.aabchq.com
AAMA	American Architectural Manufacturer's Association http://www.aamanet.org
AAN	American Nursery and Landscape Association http://www.anla.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.acgi.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
AHAM	Association of Home Appliance Manufacturers http://www.aham.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 http://www.aitc-glulam.org

AMCA Air Movement and Control Association, Inc.
<http://www.amca.org>

ANLA American Nursery & Landscape Association
<http://www.anla.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>

ASAE American Society of Agricultural Engineers
<http://www.asae.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
<http://www.asse-plumbing.org>

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

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

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

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

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

BIA Brick Institute of America
<http://www.bia.org>

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

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

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

CISCA Ceilings and Interior Systems Construction Association
<http://www.cisca.org>
 CISPI Cast Iron Soil Pipe Institute
<http://www.cispi.org>
 CLFMI Chain Link Fence Manufacturers Institute
<http://www.chainlinkinfo.org>
 CPMB Concrete Plant Manufacturers Bureau
<http://www.cpmc.org>
 CRA California Redwood Association
<http://www.calredwood.org>
 CRSI Concrete Reinforcing Steel Institute
<http://www.crsi.org>
 CTI Cooling Technology Institute
<http://www.cti.org>
 DHI Door and Hardware Institute
<http://www.dhi.org>
 EGSA Electrical Generating Systems Association
<http://www.egsa.org>
 EEI Edison Electric Institute
<http://www.eei.org>
 EPA Environmental Protection Agency
<http://www.epa.gov>
 ETL ETL Testing Laboratories, Inc.
<http://www.etl.com>
 FAA Federal Aviation Administration
<http://www.faa.gov>
 FCC Federal Communications Commission
<http://www.fcc.gov>
 FPS The Forest Products Society
<http://www.forestprod.org>
 GANA Glass Association of North America
<http://www.cssinfo.com/info/gana.html/>
 FM Factory Mutual Insurance
<http://www.fmglobal.com>
 GA Gypsum Association
<http://www.gypsum.org>
 GSA General Services Administration
<http://www.gsa.gov>
 HI Hydraulic Institute
<http://www.pumps.org>

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

ICBO International Conference of Building Officials
<http://www.icbo.org>

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

ICAC Institute of Clean Air Companies
<http://www.icac.com>

IEEE Institute of Electrical and Electronics Engineers
<http://www.ieee.org/>

IMSA International Municipal Signal Association
<http://www.imsasafety.org>

IPCEA Insulated Power Cable Engineers Association

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

MSS Manufacturers Standardization Society of the Valve and Fittings Industry Inc.
<http://www.mss-hq.com>

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

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

NBS National Bureau of Standards
 See - NIST

NBBPVI National Board of Boiler and Pressure Vessel Inspectors
<http://www.nationboard.org>

NEC National Electric Code
 See - NFPA National Fire Protection Association

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

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

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

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

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

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

NPA National Particleboard Association
18928 Premiere Court
Gaithersburg, MD 20879
(301) 670-0604

NSF National Sanitation Foundation
<http://www.nsf.org>

NWWDA Window and Door Manufacturers Association
<http://www.nwwda.org>

OSHA Occupational Safety and Health Administration
Department of Labor
<http://www.osha.gov>

PCA Portland Cement Association
<http://www.portcement.org>

PCI Precast Prestressed Concrete Institute
<http://www.pci.org>

PPI The Plastic Pipe Institute
<http://www.plasticpipe.org>

PEI Porcelain Enamel Institute, Inc.
<http://www.porcelainenamel.com>

PTI Post-Tensioning Institute
<http://www.post-tensioning.org>

RFCI The Resilient Floor Covering Institute
<http://www.rfci.com>

RIS Redwood Inspection Service
See - CRA

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

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

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

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

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

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

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

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

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

TCA Tile Council of America, Inc.
<http://www.tileusa.com>

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

TPI Truss Plate Institute, Inc.
 583 D'Onofrio Drive; Suite 200
 Madison, WI 53719
 (608) 833-5900

UBC The Uniform Building Code
 See ICBO

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

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

WCLIB West Coast Lumber Inspection Bureau
 6980 SW Varns Road, P.O. Box 23145
 Portland, OR 97223
 (503) 639-0651

WRCLA Western Red Cedar Lumber Association
 P.O. Box 120786
 New Brighton, MN 55112
 (612) 633-4334

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

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained and paid for by Contractor.

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 Society for Testing and Materials (ASTM):
- C31/C31M-06.....Making and Curing Concrete Test Specimens in the Field
 - C33-03.....Concrete Aggregates
 - C39/C39M-05.....Compressive Strength of Cylindrical Concrete Specimens
 - C138-07.....Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
 - C143/C143M-05.....Slump of Hydraulic Cement Concrete
 - C172-07.....Sampling Freshly Mixed Concrete
 - C173-07.....Air Content of freshly Mixed Concrete by the Volumetric Method
 - C330-05.....Lightweight Aggregates for Structural Concrete
 - C567-05.....Density Structural Lightweight Concrete
 - C1064/C1064M-05.....Freshly Mixed Portland Cement Concrete
 - C1077-06.....Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
 - E329-07.....Agencies Engaged in Construction Inspection and/or Testing
 - E543-06.....Agencies Performing Non-Destructive Testing
 - E605-93(R2006).....Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
 - E709-(2001).....Guide for Magnetic Particle Examination
 - E1155-96(R2008).....Determining FF Floor Flatness and FL Floor Levelness Numbers

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.; E 329, C 1077, D 3666, D3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."
- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Contracting Officer's Technical Representative. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Contracting Officer's Technical Representative to such failure.
- C. Written Reports: Testing laboratory shall submit test reports to Contracting Officer's Technical Representative, Contractor, unless other arrangements are agreed to in writing by the Contracting Officer's Technical Representative. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to Contracting Officer's Technical Representative immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONCRETE

- A. Batch Plant Inspection and Materials Testing:
 - 1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of Contracting Officer's Technical Representative with concurrence of Contracting Officer and perform periodic inspections thereafter as determined by Contracting Officer's Technical Representative.
 - 2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to Contracting Officer's Technical Representative.

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. Label each cylinder with an identification number. Contracting Officer's Technical Representative 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: Monitor and record amount of water added at project site.
- 18. Measure concrete flatwork for levelness and flatness as follows:
 - a. Perform Floor Tolerance Measurements F_F and F_L 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 Resident Engineer with the results of all profile tests, including a running tabulation of the overall F_F and F_L 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 Contracting Officer's Technical Representative. 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 Contracting Officer's Technical Representative. In test report, indicate the following information:
 - a. Cylinder identification number and date cast.
 - b. Specific location at which test samples were taken.
 - c. Type of concrete, slump, and percent air.
 - d. Compressive strength of concrete in MPa (psi).
 - e. Weight of lightweight structural concrete in kg/m^3 (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.

3.2 SPRAYED-ON FIREPROOFING

- A. Provide field inspection and testing services to certify sprayed-on fireproofing has been applied in accordance with contract documents.
- B. Obtain a copy of approved submittals from Contracting Officer's Technical Representative.
- C. Use approved installation in test areas as criteria for inspection of work.
- D. Test sprayed-on fireproofing for thickness and density in accordance with ASTM E605.
 - 1. Thickness gauge specified in ASTM E605 may be modified for pole extension so that overhead sprayed material can be reached from floor.
- E. Location of test areas for field tests as follows:
 - 1. Thickness: Select one bay per floor, or one bay for each 930 m² (10,000 square feet) of floor area, whichever provides for greater number of tests. Take thickness determinations from each of following locations: Metal deck, beam, and column.
 - 2. Density: Take density determinations from each floor, or one test from each 930 m² (10,000 square feet) of floor area, whichever provides for greater number of tests, from each of the following areas: Underside of metal deck, beam flanges, and beam web.
- F. Submit inspection reports, certification, and instances of noncompliance to Contracting Officer's Technical Representative.

3.3 TYPE OF TEST

- A. Number of Tests and Mandays: Unless otherwise indicated by Contract Documents, approximate number of tests and man days required shall be as determined by Contracting Officer's Technical Representative and, at minimum, to follow industry standard.
- B. Concrete:
 - Making and Curing Concrete Test Cylinders (ASTM C31)
 - Compressive Strength, Test Cylinders (ASTM C39)
 - Concrete Slump Test (ASTM C143)
 - Concrete Air Content Test (ASTM C173)

Unit Weight, Lightweight Concrete (ASTM C567)

Aggregate, Normal Weight:

Gradation (ASTM C33)

Deleterious Substances (ASTM C33)

Soundness (ASTM C33)

Abrasion (ASTM C33)

Aggregate, Lightweight

Gradation (ASTM C330)

Deleterious Substances (ASTM C330)

Unit Weight (ASTM C330)

Flatness and Levelness Readings (ASTM E1155) (number of days)

C. Sprayed-On Fireproofing:

Thickness and Density Tests (ASTM E605)

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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.
 - 4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
 - 5. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
 - 6. 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):
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 Contracting Officer's Technical Representative 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 Contracting Officer's Technical Representative 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.
 - 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.
 - j. Environmental Monitoring Plans for the job site including land, water, air, and noise.
 - k. 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.
- 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.
 - 1. 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.
 - 2. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 - 3. Handle discarded materials other than those included in the solid waste category as directed by the Contracting Officer's Technical Representative.
- B. 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 Illinois Environmental Protection Agency regulations 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 (such as from asphaltic batch plants) 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.

C. 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 Contracting Officer's Technical Representative. 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 Contracting Officer's Technical Representative. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise	Sound Level in dB
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):

EARTHMOVING		MATERIALS HANDLING	
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	ROCK DRILLS	80
PAVERS, STATIONARY	80	PNEUMATIC TOOLS	80
PUMPS	75	BLASTING	NA
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	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 Contracting Officer's Technical Representative noting any problems and the alternatives for mitigating actions.
- D. 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.
- E. 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 Contracting Officer's Technical Representative. 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.

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SECTION 01 58 16
TEMPORARY INTERIOR SIGNAGE

PART 1 GENERAL

DESCRIPTION

- A. This section specifies temporary interior signs.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNS

- A. Fabricate from 50 Kg (110 pound) mat finish white paper.
- B. Cut to 100 mm (4-inch) wide by 300 mm (12 inch) long size tag.
- C. Punch 3 mm (1/8-inch) diameter hole centered on 100 mm (4-inch) dimension of tag. Edge of Hole spaced approximately 13 mm (1/2-inch) from one end on tag.
- D. Reinforce hole on both sides with gummed cloth washer or other suitable material capable of preventing tie pulling through paper edge.
- E. Ties: Steel wire 0.3 mm (0.0120-inch) thick, attach to tag with twist tie, leaving 150 mm (6-inch) long free ends.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install temporary signs attached to room door frame or room door knob, lever, or pull for doors on corridor openings.
- B. Mark on signs with felt tip marker having approximately 3 mm (1/8-inch) wide stroke for clearly legible numbers or letters.
- C. Identify room with numbers as designated on floor plans.

3.2 LOCATION

- A. Install on doors that have room, corridor, and space numbers shown.
- B. Doors that do not require signs are as follows:
1. Corridor barrier doors (cross-corridor) in corridor with same number.
 2. Folding doors or partitions.
 3. Toilet or bathroom doors within and between rooms.
 4. Communicating doors in partitions between rooms with corridor entrance doors.
 5. Closet doors within rooms.
- C. Replace missing, damaged, or illegible signs.

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SECTION 01 63 00
PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Description: This Section specifies basic requirements and procedures for consideration of proposals for Substitutions made after award of Contract.

1. No substitutions are permissible after bidding period, except as limited by requirements of this Section.

B. Related Requirements:

1. Bidding requirements for substitution requests during bidding period.
2. Submittal requirements as specified in Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.2 DEFINITIONS

A. Substitution: Substitution requirements do not apply to product options. Revisions to Contract Documents are modifications, not substitutions. Substitutions requested during bidding period which have been accepted before bid due date or date of Owner-Contractor Agreement are included in Contract Documents and are not subject to substitution requirements of this Section. Determination of and meeting requirements of codes, regulations and other legal requirements of public authorities having jurisdiction over the Work are not substitutions. Requests for changing products required by Contract Documents are requests for substitution subject to substitution requirements of this Section and other Contract Documents.

1.3 SUBSTITUTIONS

A. General:

1. Request Period: Within 30 days after date of commencement of the Work established in Contract Documents, Owner and Architect will consider requests from Contractor for substitution of products in place of those required. Requests received more than 30 days after commencement of the Work may be considered or rejected at discretion of Architect.
2. Requests: Requests for substitution of product not meeting substitution requirements of this Section, including failure to submit required Substitution Request with complete supporting data for each item of consideration, will be returned without action other than to record non-compliance with substitution requirements.

3. Limitations: Substitutions requested after date of commencement of the Work established in Contract Documents will be considered only under one or more of following conditions:
 - a. Not Available: When required products are not available through no fault of Contractor including, but not limited to, following:
 - 1) Equivalent Unnamed Products: Where request is related to "or acceptable equivalent" or like language indicated by Contract Documents.
 - 2) Public Authority: Where specified product cannot receive necessary approval by public authority having jurisdiction over the Work.
 - 3) Schedule: Where product required cannot be provided within Contract Time, but not as result of failure to promptly pursue or properly coordinate work.
 - 4) Compatibility: Where product required cannot be provided in manner which is compatible with other products of the Work and Project, cannot be properly coordinated with other products of the Work and Project, cannot be warranted as required by Contract Documents, or will encounter other conditions not meeting requirements of Contract Documents which are not possible to otherwise overcome, except by making request for substitution which Contractor thereby certifies to overcome.
 - b. Owner Best Interest: When a substitution would be substantial to best interests of Owner in terms of cost, time, energy conservation or other consideration, after deducting any offsetting responsibilities including, but not limited to, additional compensation to Architect for services specified in Paragraph - Additional Costs, of this Section, increased cost of other work performed by other separate contractors or Owner, and like considerations.
4. Additional Costs:
 - a. Contract Sum: Substitutions shall not result in additions to Contract Sum.
 - b. Substitution: Contractor shall be responsible for all costs associated with Substitutions incurred by:
 - 1) Architect for evaluation review of proposed Substitutions, and for any changes to design of the Work and Project and to Contract Documents caused by accepted Substitutions, including architectural and engineering services.

- 2) Other separate contractors, if any, for increased costs of other work caused by accepted Substitutions.
5. Proposed Substitutions and work associated with or affected by Substitutions shall meet performance, layout, adjustment, support, standards and other like requirements indicated in Contract Documents.
6. Considerations: Request for Substitutions will not be considered for acceptance or as having been accepted when:
 - a. They are not timely, not completely documented or improperly submitted.
 - b. They are indicated or implied on submittals, including product data and shop drawings, without a formal request from Contractor.
 - c. They are requested by a subcontractor or supplier.
 - d. Proposed changes are not in keeping with intent of Contract Documents.
 - e. Acceptance will require substantial revision of Contract Documents.
 - f. Failure to submit required Substitution Request with complete support data for each item of consideration.
7. Proof: Burden of proof of merit of proposed substitution is upon Contractor.
8. Acceptability: Owner in consultation with Architect shall be sole judges of acceptability of a proposed substitution.
9. Beginning Work: Substitute products shall not be ordered or installed without written acceptance of Owner.
- B. Substitution Request Form: Submit a separate Substitution Request Form, Document 006325 - Substitution Request, for each proposed substitution. Support each request with data to substantiate or address each criteria in request.
- C. Submission:
 1. General: Submit each request for substitution separately. Make submissions to Architect.
 2. Quantity Required: Number of substitution requests required to be returned, plus 3 copies to be retained, 2 copies by Architect and one copy by Owner.
 3. Transmittal: Accompany each substitution request submission with a separate transmittal letter, in triplicate, containing:
 - a. Submission date.
 - b. Project name, location and number indicated by Contract Documents.
 - c. Contract identification indicated by Contract Documents.

- d. Contractor name.
 - e. General subject material covered by request for substitution.
- D. Contractor Responsibilities: Request for substitution constitutes representation of Contractor:
1. Contractor has thoroughly evaluated proposed substitution and has determined proposed substitution will result in total Work which is equal to or better than the Work originally required by Contract Documents, in every respect of significance, except as otherwise specifically stated in Substitution Request Form, and that proposed substitution will perform adequately in application indicated, regardless of equality and exceptions thereto. Contractor waives rights to additional payment and time which may subsequently be necessitated, by failure of substitution to perform adequately, and for required work to make corrections thereof.
 2. Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
 3. Same warranty will be furnished for proposed substitution as for specified product.
 4. Same maintenance service and source of replacement parts, as applicable, is available.
 5. Proposed substitution will not affect or delay progress of the Work.
 6. Cost data is complete. Claims for additional costs and time related to accepted substitution which may subsequently become apparent are to be waived and for required work to make corrections thereof.
 7. Proposed substitution does not affect dimensions and functional clearances.
 8. Payment will be made for evaluation review of proposed substitution, and for any changes to design of the Work and Project, and to Contract Documents caused by accepted substitution, including architectural and engineering services.
 9. Payment will be made for other separate contractors, if any, and Owner for increased cost of other work caused by accepted Substitutions.
 10. Coordination, installation and changes in the Work and Project as necessary for accepted substitution will be complete in all respects.

E. Architect Duties:

1. Review: Review request for substitution in consultation with Owner and accept, reject or take other appropriate action with reasonable promptness. Transmit evaluations and recommendations to Owner as applicable. Obtain written decision of Owner.
2. Results: Transmit decisions of Owner to Contractor. Acceptance will be documented by a Contract Modification. Rejection will include statement of reason for rejection.

- - - END - - -

GEMS Awareness Training for Contractors

All federal agencies are required by Executive Order to implement an Environmental Management System, reduce waste, reduce quantity of toxic and hazardous chemical and materials acquired, used or disposed of, increase diversion of solid waste by recycling, and use sustainable environmental practices (acquisition of bio-based, environmentally preferable, energy-efficient, water-efficient and recycled-content products).

The Department of Veterans Affairs has chosen the term GEMS to refer to the department's Green Environmental Management System. Green Environmental Management Systems have been shown to be a valuable tool to lessen negative impacts on the environment, and create more efficient, cost effective means of providing service to our veterans. **The GEMS program emphasizes importance of compliance to federal, state, and local regulations; encourages pollution prevention strategies whenever possible; and focuses on continued improvement on environmental issues.** The GEMS Program is based on ISO 14001, which relates to Environmental Management Systems (EMS). The EMS provides a framework to review activities performed by, or on behalf of the organization, including work performed by contractors.

Any parties, including contractors, who perform an activity identified as being significant based on the impact on the environment, environmental compliance, exposure risk, etc., must be aware of our facility GEMS program and ways to reduce the environmental impacts.

Training for contractors involved in construction, renovation or demolition shall consist of being made knowledgeable of VA Master Specifications Section 01 74 19 by their employer regarding construction waste management. The below signer certifies that each member of their staff who is involved in significant construction waste management activities has been given a copy of VA Master Specifications Section 01 74 19.

Acknowledgement of Contractor Receipt of this Document

Company: _____

Received by (print
name): _____

Signature: _____

Date: _____

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

1.3 QUALITY ASSURANCE

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
 - 1. Excess or unusable construction materials.
 - 2. Packaging used for construction products.
 - 3. Poor planning and/or layout.
 - 4. Construction error.
 - 5. Over ordering.
 - 6. Weather damage.
 - 7. Contamination.
 - 8. Mishandling.
 - 9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to reuse and recycle new materials to a minimum of 75 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org> 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 Contracting Officer's Technical Representative 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, and recycled.
 - b. List of each material and quantity proposed to be taken to a landfill.
 - 4. Detailed description of the Means/Methods to be used for material handling.
 - a. On site: Material separation, storage, protection where applicable.
 - b. Off site: Transportation means and destination. Include list of materials.
 - 1) Description of materials to be site-separated and self-hauled to designated facilities.
 - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
 - c. The names and locations of mixed debris reuse and recycling facilities or sites.
 - d. The names and locations of trash disposal landfill facilities or sites.
 - e. Documentation that the facilities or sites are approved to receive the materials.
- C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.
- D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.6 APPLICABLE PUBLICATIONS

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

1.7 RECORDS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. List of each material and quantity to be salvaged, recycled, and 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.

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Construction Project Waste Minimization Report							
(Provide documentation for all waste/recycling streams)							
Project Name/Number:						Date:	
Material (circle NA if not applicable)		Quantity (lbs or tons)	Destination (facility name and phone)	Material (circle NA if not applicable)		Quantity (lbs or tons)	Destination (facility name and phone)
Appliances (other than HVAC)	N A			HVAC Appliances	N A		
Asbestos	N A			Light fixtures	N A		
Asphalt	N A			Metal pipe	N A		
Batteries	N A			Non PCB-ballasts	N A		
Brick	N A			Scrap metal	N A		
Bulk waste	N A			Siding	N A		
Ceiling tiles	N A			Sinks/toilets	N A		
Concrete	N A			Vegetation	N A		
Doors	N A			Windows	N A		
Excavated dirt/rock	N A			Wire	N A		
Fluorescent tubes	N A			Wood/Lumber	N A		
Hardware	N A			Other:	N A		

VA Construction Waste Management Specifications (Section 01 74 19) require "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 above. The contractor shall, (1.7 Records)" 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."

Note: Contractor should submit copies of weigh tickets from the disposal center as back up documentation of the quantities indicated above.
 (3.3 Report) "With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal."
 (1.3 D Quality Assurance) "Any revenues or savings obtained from salvage or recycling shall accrue to the contractor."

SECTION 01 77 00
CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section specifies administrative and procedural requirements for closeout submittals.

1.2 CLOSEOUT SUBMITTALS

- A. General: After Certificate of Substantial Completion has been issued and before Owner occupancy of the Work or designated portion of the Work, Contractor shall submit duly executed closeout submittals for transmittal to Contracting Officer's Technical Representative, except as otherwise required by Contract Documents. All closeout documents shall be provided in labeled three ring binders and as PDFs on CDs as applicable.
- B. Certificates: Evidence of compliance with requirements of public authorities bearing on performance of the Work including, but not limited to, following:
1. Certificate of Occupancy.
 2. Certificates of Inspection:
 - a. Miscellaneous building specialties, equipment and systems, as applicable.
 - b. Electrical:
 - 1) Electrical equipment and systems.
- C. Other Closeout Submittals:
1. Final surveys.
 2. Record documents.
 3. Operation and maintenance data manuals.
 4. Operation and maintenance instructions to personnel of Owner.
 5. Warranties.
 6. Keys and keying schedule.
 7. Spare parts and maintenance products.
 8. Final photographs.
 9. Certificate of insurance for products and completed operations.
 10. Evidence of Payments and Release of Liens:
 - a. Contractor affidavit of payment of debts and claims.
 - b. Contractor affidavit of release of liens.
 - 1) Consent of surety to final payment.
 - 2) Contractor release or waiver of liens.

- 3) Separate releases of waivers of liens for subcontractors, suppliers and others with lien rights against property of Owner, together with list of those parties.
11. Photocopy evidence of each general and specialty permit and formal approval obtained for performing the Work as required by Contract Documents.
12. Financial log to include all supplemental and change orders including information required in Article - Final Adjustment of Accounts.
13. Other documents or items related to the Work which may be requested by Owner, including, but not limited to, the following:
- a. Certified Payroll.
 - b. Daily Logs.
 - c. Hot Work Permits.
 - d. Meeting Minutes.
 - e. Monthly Reports.
 - f. Open Issues Log.
 - g. Pay Requests.
 - h. Safety Reports.

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SECTION 019100
GENERAL COMMISSIONING REQUIREMENTS

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SECTION 019100
GENERAL COMMISSIONING REQUIREMENTS

REV1 **PART 1 - GENERAL**

1.1 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 7, Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, 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 7, Division 8, Division 21, Division 22, Division 23, Division 26, Division 27 and Division 28 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 contract 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.

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 COTR 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 and the COTR.

- B. In this structure, only two contract parties are recognized and communications on contractual issues are strictly limited to VA COTR 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 COTR 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 COTR.
- C. Commissioning is a process that relies upon frequent and direct communications, as well as collaboration between all parties to the construction process. By its nature, a high level of communication and cooperation between the Commissioning Agent and all other parties (Architects, Engineers, Subcontractors, Vendors, third party testing agencies, etc) is essential to the success of the Commissioning effort.
- D. 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 COTR. 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 COTR 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 COTR to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or COTR will issue an official directive to this effect.
4. All parties to the Commissioning Process shall be individually responsible for alerting the COTR 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 COTR, 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 23 08 00 COMMISSIONING OF HVAC 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.
- B. The commissioning activities have been developed to support the VA requirements to meet guidelines for Federal Leadership in Environmental, Energy, and Economic Performance.

1.5 DEFINITIONS

- A. Architect: Includes Architect identified in the Contract for Construction between the Department of Veterans Affairs and Contractor, plus consultant/design professionals responsible for design of fire suppression, plumbing, HVAC, controls for HVAC systems, electrical, communications, electronic safety and security, as well as other related systems.
- B. CxA: Commissioning Agent.
- C. Commissioning Plan: a document that is an overall plan that outlines the commissioning process, commissioning team responsibilities, schedule for commissioning activities, and commissioning documents.
- D. Commissioning Issue: a condition in the installation or function of a component, piece of equipment or system that affects the system operations, maintenance, and/or repair.

- E. Commissioning Observation: a condition in the installation or function of a component, piece of equipment or system that may not be in compliance with the Contract Documents, or may not be in compliance with the manufacturer's installation instruction, or may not be in compliance with generally accepted industry standards.
- F. Systems Functional Performance Test: a test, or tests, of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Systems Functional Performance Testing is the dynamic testing of systems (rather than just components) under full operation. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not Systems Functional Performance Testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while System Functional Performance Testing is verifying that the system has already been set up properly and is functioning in accordance with the Construction Documents. The Commissioning Agent develops the Systems Functional Performance Test Procedures in a sequential written form, coordinates, witnesses, and documents the actual testing. Systems Functional Performance Testing is performed by the Contractor. Systems Functional Performance Tests are performed after startups, control systems are complete and operational, TAB functions and Pre-Functional Checklists are complete.
- G. System: A system is defined as the entire set of components, equipment, and subsystems 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 component of an entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, direct expansion coils, hot water supply, controls and electrical service, etc.

- H. Pre-Functional Checklist: a list of items provided by the Commissioning Agent to the Contractor that require inspection and elementary component tests conducted to verify proper installation of equipment. Pre-Functional Checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some Pre-Functional Checklist items entail simple testing of the function of a component, a piece of equipment or system. The term "Pre-Functional" refers to before Systems Functional Performance Testing. Pre-Functional Checklists augment and are combined with the manufacturer's startup checklist and the Contractor's Quality Control checklists.
- I. Seasonal Functional Performance Testing: a test or tests that are deferred until the system will experience conditions closer to their design conditions.
- J. VA: Includes the Contracting Officer, COTR, or other authorized representative of the Department of Veterans Affairs.
- K. TAB: Testing, Adjusting, and Balancing.

1.6 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. Also refer to commissioning charts for details.
- B. Summary of Items to be commissioned:
1. HVAC:
 - a. AHU-1
 - b. Air-cooled condensing units CU-1, ACCU-2 and ACCU-3
 - c. Variable frequency drive
 - d. VAV boxes
 - e. Split system AC-1 and AC-2
 - f. Steam fin tube radiation
 - g. Exhaust fans
 - h. Steam piping/valves
 - i. DDC controls & BAS tie in
 - j. Air testing & balancing
 - k. Piping & equipment identification

- l. Piping insulation
- m. Training
- n. Seasonal inspection & testing
- 2. Plumbing:
 - a. Hot water supply/return
 - b. Cold water
 - c. Plumbing fixtures: water closets, lavatories, service sink, single bowl sink, floor drain, etc.
 - d. Piping insulation
- 3. Fire Protection:
 - a. Sprinkler heads
 - b. Pressure in piping mains
- 4. Electrical:
 - a. Electrical panels
 - b. Receptacles
 - c. Automatic doors
 - d. Lights/switches/controls
 - e. Automatic transfer switches
 - f. Exit signs
 - g. Fire alarm
 - h. Audio/visual conference call system
 - i. Tele/data communication systems
 - j. Security & intrusion system

1.7 COMMISSIONING TEAM

A. Members Appointed by Contractor:

- 1. Contractor: The designated person, company, or entity that plans, schedules and coordinates the commissioning activities for the construction team.
- 2. 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. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project Superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the Department of Veterans Affairs (VA) and Commissioning Agent.

B. Members Appointed by VA:

1. Commissioning Agent: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. The VA will engage the CxA under a separate contract.
2. Representatives of the facility user and operation and maintenance personnel.
3. Architect and engineering design professionals.

1.8 VA'S COMMISSIONING RESPONSIBILITIES

- A. Appoint an individual, company or firm to act as the Commissioning Agent.
- B. 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.
- C. Provide the Construction Documents, prepared by Architect 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.

1.9 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

- A. The Contractor shall assign a Commissioning Person to manage commissioning activities of the Contractor, and subcontractors.
- B. 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.
- C. The Contractor shall ensure that each installing subcontractor shall assign representative 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.

1.10 COMMISSIONING AGENT'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Prepare the commissioning plan. See Paragraph 1.11-A of this specification Section for further information.
- 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; TAB Work; 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. Observe construction and report progress, observations and issues. Observe systems and equipment installation for adequate accessibility for maintenance and component replacement or repair, and for general conformance with the Construction Documents.
- G. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.
- H. Coordinate Systems Functional Performance Testing schedule with the Contractor.
- I. Witness selected systems startups.
- J. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.
- K. Witness and document Systems Functional Performance Testing.
- L. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
- M. Review and comment on operation and maintenance (O&M) documentation and systems manual outline for compliance with the Contract Documents.
- N. Review operation and maintenance training program developed by the Contractor. Verify training plans provide qualified instructors to conduct operation and maintenance training.
- O. Prepare commissioning Field Observation Reports.
- P. Prepare the Final Commissioning Report.

- Q. Return to the site at 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal Systems Functional Performance Testing. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.
- R. Assemble the final commissioning documentation, including the Final Commissioning Report and Addendum to the Final Commissioning Report.

1.11 COMMISSIONING DOCUMENTATION

- A. Commissioning Agent's Certification(s): Commissioning Agent shall submit evidence of valid and current certification(s).
- B. 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.
- C. 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.

- D. 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.
- E. 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.
- F. 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.
- G. 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.

H. 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.

I. Addendum to Final Commissioning Report: The Commissioning Agent will prepare an Addendum to the Final Commissioning Report near the end of the Warranty Period. The Addendum will indicate whether systems, subsystems, and equipment are complete and continue to perform according to the Contract Documents. The Addendum to the Final Commissioning Report shall include, but is not limited to, the following:

1. Documentation of deferred and off season test(s) results.
2. Completed Systems Functional Performance Test Procedures for off season test(s).
3. Documentation that unresolved system performance issues have been resolved.

4. Updated Commissioning Issues Log, including status of unresolved issues.
 5. Identification of potential Warranty Claims to be corrected by the Contractor.
- J. Systems Manual: The Commissioning Agent will gather required information and compile the Systems Manual. The Systems Manual will include, but is not limited to, the following:
1. Design Narrative, including system narratives, schematics, single-line diagrams, flow diagrams, equipment schedules, and changes made throughout the Project.
 2. Reference to Final Commissioning Plan.
 3. Reference to Final Commissioning Report.
 4. Approved Operation and Maintenance Data as submitted by the Contractor.

1.12 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 will be provided by the Commissioning Agent. It will contain 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. The schedule will be established after construction schedule is prepared by General Contractor.
 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 COTR 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.

1.13 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 15 days of contract award, the Contractor shall designate a specific individual as the Commissioning Representative to manage and lead the commissioning effort on behalf of the Contractor. The Commissioning Representative shall be the single point of contact and communications for all commissioning related services by the Contractor.

- C. Within 15 days of contract award, the Contractor shall ensure that each subcontractor designates specific individuals as Commissioning Representatives (CR) 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.

1.14 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.

1.15 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 will work with the Commissioning Agent and the VA to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information 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.

REV1 **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 when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

REV1 **PART 3 - EXECUTION**

3.1 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 new and existing 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.
 - a) The Commissioning Agent will submit the full startup plan to the VA and Contractor for review. Final approval will be by the VA.
 - b) 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 existing & new temperature, relative humidity, and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described in Division 21, Division 22, Division 23, Division 26, Division 27, and Division 28 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.

3.2 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.

3.3 PHASED COMMISSIONING

- A. The project may require startup and initial checkout to be executed in phases. This phasing shall be planned and scheduled in a coordination meeting of the VA, Commissioning Agent, and the Contractor. Results will be added to the master construction schedule and the commissioning schedule.

3.4 TRENDING AND ALARMS

- 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.
 - 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. Verify existing alarms and alarm for new devices.

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. Many of these alarms points may be existing in the existing Building Automation System. Test these and new alarms.

Dual-Path Air Handling Unit Trending and Alarms							
Point	Type	Trend Interval	Operational Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
RA Temperature	AI	15 Min	24 hours	3 days	N/A		
RA Humidity	AI	15 Min	24 hours	3 days	P	>60% RH	10 min
Mixed Air Temp	AI	None	None	None	N/A		
SA Temp	AI	15 Min	24 hours	3 days	C	±5°F from SP	10 min
Supply Fan Speed	AI	15 Min	24 hours	3 days	N/A		
RA Pre-Filter Status	AI	None	None	None	N/A		
After Filter Status	AI	None	None	None	N/A		
SA Flow	AI	15 Min	24 hours	3 days	C	±10% from SP	10 min
OA Supply Temp	AI	15 Min	24 hours	3 days	P	±5°F from SP	10 min
RA Supply Temp	AI	15 Min	24 hours	3 days	N/A		

Dual-Path Air Handling Unit Trending and Alarms							
Point	Type	Trend Interval	Operational Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
RA Dx Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA Steam Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA Flow	AI	15 Min	24 hours	3 days	P	±10% from SP	5 min
RA Flow	AI	15 Min	24 hours	3 days	P	±10% from SP	5 min
Duct Pressure	AI	15 Min	24 hours	3 days	C	±25% from SP	6 min
Supply Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
High Static Status	DI	COV	24 hours	3 days	P	True	1 min
Fire Alarm Status	DI	COV	24 hours	3 days	C	True	5 min
Freeze Stat Level 1	DI	COV	24 hours	3 days	C	True	10 min
Emergency AHU Shutdown	DI	COV	24 hours	3 days	P	True	1 min
High Static Alarm	DI	COV	24 hours	3 days	C	True	10 min
Supply Fan Speed	AO	15 Min	24 hours	3 days	N/A		
RA Dx Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA Steam Valve Position	AO	15 Min	24 hours	3 days	N/A		

Terminal Unit (VAV, CAV, etc.) Trending and Alarms							
Point	Type	Trend Interval	Operational Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Space Temperature	AI	15 Min	12 hours	3 days	P	±5°F from SP	10 min
Air Flow	AI	15 Min	12 hours	3 days	P	±5°F from SP	10 min
SA Temperature	AI	15 Min	12 hours	3 days	P	±5°F from SP	10 min
Local Set-point	AI	15 Min	12 hours	3 days	M	±10°F from SP	60 min
Damper Position	AO	15 Minutes	12 hours	3 days	N/A		
Heating coil Valve Position	AO	15 Minutes	12 hours	3 days	N/A		

C. 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 COTR 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

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 including air handling unit AHU-1 Functional Performance Test is to verify and document compliance with the stated criteria of acceptance given on the test form. 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. 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.
 2. 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.

3. 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 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% 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 COTR, 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 21, Division 22, Division 23, Division 26, Division 27 and Division 28 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, and facilities needed to avoid delays.
- 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 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. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder.

D. QUALITY ASSURANCE

1. Instructor Qualifications: A factory authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

E. 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. Fire protection systems, including fire alarm, and fire suppression systems.
 - b. Intrusion detection systems.
 - c. HVAC systems, including existing air handling equipment, air distribution systems, and terminal equipment and devices.
 - d. Panelboards.
 - e. Lighting equipment and controls.
 - f. Communication systems, including intercommunication, public address, voice and data, and entertainment television equipment.

- 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. Instructor: Qualified instructors shall 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: Record each training module separately. At beginning of each training module, record each chart containing learning objective and lesson outline.

REV1

COMMISSIONING CHARTS

T&M ASSOCIATES, INC
VA 578-11-094
18MAY12
29MAR13 (REV1)

01 91 00 - 41

AIR HANDLING UNIT PRE-FUNCTIONAL CHECKLIST – AHU-1 <i>Hines VA – PAS-EPC Renovation Commissioning</i>		
Date:		
Unit #:		
Area Served:		
Location:		
Model Verification		
1		1=specified 2=installed
Manufacturer		
2		
1		
Model		
2		
serial #		
1		
SF Electrical		
2		
1		
SF Starter		
2		
1		
Pre-filters		
2		
General		Comp. Y/N
Equipment cleaned and properly labeled		
Inspection and access doors are operable		
Any damage to coil tubing or fins has been repaired.		
Filters		Comp. Y/N
Disposable filters clean and in place.		
No gaps to allow air bypass around filters.		
Unit		Comp. Y/N
Condensate drainage is unobstructed (Pour water into drain pan.)		
Unit controlled via BAS		
Dampers are operational.		
Piping		Comp. Y/N
Refrigerant suction & liquid lines, valves, strainer w/blowdown, union, thermometer, pressure gauge, flex, coil with air vent, flex, pressure gauge, thermometer, union, control valve, flow control device		
Steam and condensate return piping: supply, shutoff valve, strainer w/blowdown, union, thermometer, pressure gauge, flex, coil with air vent, flex, pressure gauge, thermometer, union, control valve, flow control device		
Insulation and Labeling		Comp. Y/N
Refrigerant suction piping is insulated		
Steam and condensate return piping is insulated		
Condensate drain piping is insulated		
All piping properly color coded per existing and labeled.		

AIR HANDLING UNIT PRE-FUNCTIONAL CHECKLIST – AHU-1 Hines VA – PAS-EPC Renovation Commissioning	
Date:	
Electrical	Comp. Y/N
Power available to unit control panel	
Proper motor rotation verified	
Verify that power disconnect is located within sight of the unit controls and labeled	
Check for voltage & color coding of conductor	
Installation Inspection and testing	Comp. Y/N
Installation of system and balancing devices allowed balancing to be completed following accepted procedures and contract documents	
Operational Checks	Comp. Y/N
The HOA switch properly activates and deactivates the unit	
Fan rotation verified correct , belt tightness	
No unusual noise or vibration	
No leaking apparent around fittings	
Sequences of operation and operating schedules have been implemented	
Point-to-point checks have been completed for this system	
Startup report includes written certification from contractor that all specified features, controls and safeties are functioning properly and that the application comply with the manufacturer's recommendations.	
Notes	

AIR HANDLING UNIT FUNCTIONAL PERFORMANCE TEST – AHU-1 Hines VA – PAS-EPC Renovation Commissioning			
Unit #: Area Served: Location:			
Pre-test setpoints			
Parameter	Pretest Value	Returned to pretest setpoint	
Refrigerant control valve	auto		
SAT	52		
Dirty Filter Stpt	Pre=0.5"; Final=1.2"		
Mode	Test Procedure	Expected response	Comp, Y/N
Fan Off	The unit is commanded off by the BAS	Verify by visual response that:	
		1. Supply fan stops	
		2. Outside air dampers closed	
		3. Control valves are closed	
		4. Steam valve closed , open if OAT<35	
		5. HVAC Control system & graphic updates to indicate condition	
Fan Start	The unit is commanded on by the BAS	Verify by visual response that:	
		Supply Fan HOA is in auto	
		1. Outside air dampers open	
		2. Supply fan starts	
		3. Control modulate to maintain SA temperature	
		4. Steam coil valves modulate to control SA temperature	
		5. Alarms/sensors (freeze, filter, etc.) operational	
OA damper failure	Disable the OA damper	Verify by visual response that:	
		1. Unit shuts down	
		2. Unit requires reset ant the operator's terminal	
		3. HVAC Control graphic updates to indicate each condition	
SA fan control	Vary the static pressure sensor setpoint	Verify by visual response that:	
		1. Supply Fan VFD modulates fan speed as required to maintain static pressure sensor setpoint.	
		2. Final supply air quantity, SP, RPM.	
		3. HVAC Control system & graphic updates to indicate each condition	
SAT control - summer	1. Record SAT setpoint 2. Vary the SAT setpoint	Verify by visual response that:	
		1. Refrigerant control valves modulate to maintain setpoint within +/- 0.5%. Setpt = _____ Actual= _____	
		2. SAT is limited by a SA low limit	
		3. Setpoint changed to _____ Actual=_____	
		4. Time from adjustment to steady state at new setpoint	
		5. HVAC Control system & graphic updates to indicate each condition	

AIR HANDLING UNIT FUNCTIONAL PERFORMANCE TEST – AHU-1 Hines VA – PAS-EPC Renovation Commissioning			
Unit #: Area Served: Location:			
Mode	Test Procedure	Expected response	Comp, Y/N
Heating coil control OAT>35	1. Vary the SAT by changing the set-points.	Verify by visual response that:	
		1. Steam valve modulates to maintain setpoint within +/- 0.5%. Setpt = _____ Actual= _____	
		2. Setpoint changed to _____ Actual= _____	
		3. Time from adjustment to steady state at new setpoint	
		4. HVAC Control system & graphic updates to indicate each condition	
Freezestat	DDC Controls	Verify by visual response that:	
		1. Unit shuts down	
		2. Unit requires reset ant the operator's terminal	
		3. HVAC Control graphic updates to indicate each condition	
Pre -Filter Alarm operation	Override the value of 1. the "dirty" setpt to initiate alarm. 2. Reset setpt to normal.	Verify by visual response that:	
		1. An alarm is initiated in the BAS	
		2. Alarm automatically clears	
		3. HVAC Control graphic updates to indicate each condition	
Supply smoke detected	1. Alarm in zone or SA	Verify by visual response that:	
		1. Supply fan shuts down	
		2. OA damper closes	
		3. Exhaust damper opens	
		4. Return air damper closes.	
		5. HVAC Control graphic updates to indicate each condition	
Comments:			

COMMISSIONING CHARTS FOR MISCELLANEOUS ITEMS:

I. HVAC:

1. VAV Boxes: CA will select four (4) VAV boxes to be tested.

	Meets Criteria: Y/N				Remarks:
	#1	#2	#3	#4	
A. VAV box size per design	Y/N	Y/N	Y/N	Y/N	
B. Inlet size per design	Y/N	Y/N	Y/N	Y/N	
C. Rated CFM per design	Y/N	Y/N	Y/N	Y/N	
D. Minimum air flow setting per design	Y/N	Y/N	Y/N	Y/N	
E. Controller operation per design	Y/N	Y/N	Y/N	Y/N	
F. Thermostat operation per design	Y/N	Y/N	Y/N	Y/N	
G. Controls from BAS	Y/N	Y/N	Y/N	Y/N	
H. VAV box supported properly	Y/N	Y/N	Y/N	Y/N	
I. Is there adequate access to VAV box	Y/N	Y/N	Y/N	Y/N	

2. Steam Fin Tube Radiation: CA shall select four (4) fin tube radiation units.

A. Steam valve response per design	Y/N	Y/N	Y/N	Y/N	
B. Thermostat operation per design	Y/N	Y/N	Y/N	Y/N	
C. Is there proper access to valves	Y/N	Y/N	Y/N	Y/N	

3. Supply Air Diffusers: CA will select six (6) supply diffusers.

A. Supply air quantity (CFM) as designed	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	
B. Noise per design	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	

4. Return Air Grille: CA will select four (4) grilles.

A. Return air quantity (CFM) per design	Y/N	Y/N	Y/N	Y/N	
B. Noise per design	Y/N	Y/N	Y/N	Y/N	

5. Exhaust Air Grille: CA will select one (1) grille.

A. Exhaust air quantity meets design	Y/N	----	----	----	
B. Noise meets design	Y/N	----	----	----	

6. Air-cooled Condensing Unit:

A. Is unit on concrete pad?	Y/N	Y/N	Y/N	----	
B. Does unit have proper clearances for air circulation	Y/N	Y/N	Y/N	----	
C. Does unit have proper maintenance space	Y/N	Y/N	Y/N	----	
D. Are all valves properly installed	Y/N	Y/N	Y/N		

7. Exhaust Fans TEF-1, TEF-2 & EF-1:

A. Backdraft damper installed	Y/N	Y/N	Y/N	----	
B. Does fan run continuously?	Y/N	Y/N	Y/N	----	
C. Is fan noisy?	Y/N	Y/N	Y/N	----	
D. Is exhaust fan supported properly	Y/N	Y/N	Y/N		

8. Identification:

	Meets Criteria: Y/N				Remarks:
A. Dx water piping identified	Y/N	----	----	----	
B. Steam piping identified	Y/N	----	----	----	
C. Condensate return piping identified	Y/N	----	----	----	
D. Supply duct identified	Y/N	----	----	----	
E. Return duct identified	Y/N	----	----	----	
F. Exhaust duct identified	Y/N	----	----	----	

9. Insulation:

	Meets Criteria: Y/N				Remarks:
A. Refrigerant piping insulated	Y/N	----	----	----	
B. Steam piping insulated	Y/N	----	----	----	
C. Condensate return piping insulated	Y/N	----	----	----	
D. Supply air duct insulated	Y/N	----	----	----	

10. Supports/Hangers:

	Meets Criteria:	Remarks:
A. Dx piping supported properly inside and outside building	Y/N	
B. Is steam & condensate return piping supported properly	Y/N	
C. Is supply & return air duct supported properly	Y/N	

II. Plumbing:

1. Plumbing Fixtures:

Meets Criteria: Y/N

Remarks:

	WC-1	WC-2	S-1	L-1	L-2	Shower	SS-1	EWC-1	
A. Flow adequate	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	
B. Pressure adequate	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	
C. Valves open & close easy	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	
C. Is unit supported per design	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	

2. Floor Drains:

Meets Criteria: Remarks:

A. Does water run through floor drain easily?	Y/N	
---	-----	--

3. Cold Water:

Meets Criteria: Remarks:

A. Temperature per design	Y/N	
---------------------------	-----	--

4. Hot Water:

Meets Criteria: Remarks:

A. Temperature per design	Y/N	
---------------------------	-----	--

5. Identification:

Meets Criteria: Remarks:

A. Cold water piping identified	Y/N	
B. Hot water supply identified	Y/N	
C. Hot water return identified	Y/N	

6. Insulation Piping:

Meets Criteria: Remarks:

A. Cold water supply insulated	Y/N	
B. Hot water supply insulated	Y/N	
C. Domestic hot water supply insulated	Y/N	
D. Hot water return insulated	Y/N	

7. Piping Supports & Hangers:

Meets Criteria: Remarks:

A. Is cold water piping supported properly	Y/N	
B. Is hot water supply & return supported properly	Y/N	

III. Fire Suppression System:

Meets Criteria:

Remarks:

A. Sprinkler heads as specified	Y/N	
B. Are zone valves functioning properly	Y/N	
C. Are flow switches & tamper switches connected to fire alarm system	Y/N	
D. Is piping supported properly	Y/N	

IV. Electrical:

1. Electrical Panels:

Meets Criteria:				Remarks:		
	IG-RP-1A	IG-RP-1B	IG-CCP	IG-MP1	IGED (exist.)	G2-NE (exist.)
A. Panelboard identified	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
B. Panelboard has typed directory	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
C. Panelboard door in door type	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
D. Amp/voltage/phase identified	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
E. Incoming breaker size per spec in MDP	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
F. Is panel properly anchored to work	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
G. Proper access in front of panel	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
H. Feeders are of right size & color coded	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Remarks:						

2. Light Switches/Fixtures:

Meets Criteria:		Remarks:
A. All switches functioning properly	Y/N	
B. Light fixtures installed per design	Y/N	
C. No. of lamps per design	Y/N	
D. All fixtures functioning properly	Y/N	

3. Exit Signs:

Meets Criteria:		Remarks:
A. Have proper direction sign	Y/N	
B. All are lit	Y/N	
C. Are they powered from EM life safety-panel?	Y/N	

4. Identification:

Meets Criteria:		Remarks:
A. All equipments are identified	Y/N	
B. All receptacles are identified with circuit no. & panel they are served from	Y/N	
C. All tele/data cables are identified per VA standards	Y/N	

5. Variable Frequency Drive:

Meets Criteria: Remarks:

A. Is it of right capacity voltage	Y/N	
B. Does it have manual bypass	Y/N	
C. Supported properly on wall or unistruts	Y/N	

6. Automatic Transfer Switch:

Meets Criteria: Remarks:

A. ATS identified	Y/N	
B. Does ATS have proper working clearances	Y/N	
C. Is ATS properly mounted	Y/N	
D. Is normal & emergency sides connected properly	Y/N	

7. Disconnect Switches:

Meets Criteria: Remarks:

A. Disconnect switch identified	Y/N	
B. Disconnect switch properly mounted and installed	Y/N	
C. Proper ON/OFF position identified	Y/N	
D. Does disconnect switch have proper working clearances	Y/N	
E. Does disconnect switch have proper NEMA rating for indoor/outdoor application	Y/N	

V. TELE/DATA COMMUNICATION SYSTEM:

	Meets Criteria:	Remarks:
A. Is wiring Cat 6	Y/N	
B. Are wiring for voice & data different color	Y/N	
C. Are tele/data outlets identified	Y/N	
D. Is wiring in conduit and properly supported	Y/N	
E. Is tele/data outlet loose	Y/N	
F. Conduit size ok	Y/N	
G. Cable tray anchored properly	Y/N	
H. Racks properly supported	Y/N	
I. Power outlets in tele/data room on EM power	Y/N	
J. Grounding done properly i.e. racks, cable tray	Y/N	
K. Ground bar properly mounted on insulators	Y/N	
L. Are ground bar connectors with two hole lugs	Y/N	

VI. Fire Alarm:

Meets Criteria:		Remarks:
A. Fire alarm devices installed at proper location & height	Y/N	
B. Pull stations installed near exit doors	Y/N	
C. Fire alarm voice system functions properly	Y/N	
D. Duct smoke detectors are tied to fire alarm system	Y/N	
E. Junction boxes are color coded & identified	Y/N	
F. Conduit painted per VA standards	Y/N	

VII. Security Cameras:

	Meets Criteria:	Remarks:
A. Security cameras installed at proper location	Y/N	
B. Cameras connected to security panel in security room	Y/N	
C. Camera wiring in conduit	Y/N	
D. Security conduits painted per VA standards	Y/N	
E. Where power is required, is it EM power	Y/N	

SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

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

1.2 RELATED WORK

- A. Safety Requirements: GENERAL CONDITIONS Article - ACCIDENT PREVENTION.
- B. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Asbestos Removal: Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT, Section 02 82 13.13, GLOVEBAG ASBESTOS ABATEMENT, Section 02 82 13.19, ASBESTOS FLOOR TILE AND MASTIC ABATEMENT
- E. Lead Paint: Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
- F. Microbe Removal: Section 02 85 00, MICROBIAL REMEDIATION.
- G. Light Removal: Section 02 86 00, FLUORESCENT AND HIGH INTENSITY DISCHARGE LIGHTS REMOVAL.
- H. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- I. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article - INFECTION PREVENTION MEASURES.

1.4 PROTECTION

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

- D. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.
- E. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.
- F. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
 - 1. No wall or part of wall shall be permitted to fall outwardly from structures.
 - 2. Maintain at least one stairway in each structure in usable condition to highest remaining floor. Keep stairway free of obstructions and debris.
 - 3. 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.
 - 4. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
- G. Before beginning any demolition work, the Contractor shall survey the site 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 Medical Center; any damaged items shall be repaired or replaced as approved by the Contracting Officer's Technical Representative. 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 Contracting Officer's Technical Representative's approval.
- H. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, and Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT.

- I. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article - INFECTION PREVENTION MEASURES.

1.5 UTILITY SERVICES:

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DEMOLITION:

- A. Completely demolish and remove buildings and structures, including all appurtenances related or connected thereto, as noted below:
1. As required for installation of new utility service lines.
 2. To full depth within an area defined by hypothetical lines located 1500 mm (5 feet) outside building lines of new structures.
- B. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center Property to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer's Technical Representative. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.
- D. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 1500mm (5feet) below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications.

- E. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer's Technical Representative. When Utility lines are encountered that are not indicated on the drawings, the Contracting Officer's Technical Representative shall be notified prior to further work in that area.

3.2 CLEAN-UP:

- A. On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to Contracting Officer's Technical Representative. Clean-up shall include off the Medical Center Property disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

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SECTION 02 82 11
TRADITIONAL ASBESTOS ABATEMENT

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PART 1 - GENERAL**1.1 SUMMARY OF THE WORK****1.1.1 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 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 Asbestos Abatement Contractor discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the Contracting Officer for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor without obtaining guidance from the Contracting Officer shall become the sole risk and responsibility of the Asbestos Abatement Contractor. All costs incurred due to such action are also the responsibility of the Asbestos Abatement Contractor.

1.1.2 EXTENT OF WORK

- A. Below is a brief description of the estimated quantities of asbestos containing materials to be abated. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Contractor shall satisfy himself as the actual quantities to be abated. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents.
- B. Removal, clean-up and disposal of asbestos containing materials (ACM) and asbestos/waste contaminated elements in an appropriate regulated area for the following approximate quantities;

15,500 square feet of floor tiles, mastic, carpet glue, stair covers, floor sheets

2200 linear feet of pipe insulation

150 each elbows, fittings, joints on pipes

15 each fire doors

20 linear feet of damper cloth

50 square feet of flashing sealant

EPSTEIN 11270

VA 578-11-094

18MAY12

22NOV13 (A1)

02 82 11-1

150 linear feet of window caulk

1.1.3 RELATED WORK

- A. Section 07 84 00, FIRESTOPPING.
- B. Section 02 41 00, DEMOLITION.
- C. Division 09, FINISHES
- D. Division 22, PLUMBING.
- E. Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION, Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, and Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- F. Section 23 07 11, HVAC AND PLUMBING INSULATION.
- G. Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING, Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING, Section 22 11 00, FACILITY WATER DISTRIBUTION, and Section 22 13 00, FACILITY SANITARY SEWERAGE.
- H. Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING.
- I. Section 23 31 00, HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.

1.1.4 TASKS

- A. The work tasks are summarized briefly as follows:
- B. 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.
- C. Abatement activities including removal , clean-up and disposal of ACM waste, recordkeeping, security, monitoring, and inspections.
- D. Cleaning and decontamination activities including final visual inspection, air monitoring and certification of decontamination.

1.1.5 CONTRACTORS USE OF PREMISES

- A. The Contractor and Contractor's personnel shall cooperate fully with the VA representative/consultant to facilitate efficient use of buildings and areas within buildings. The Contractor shall perform the work in accordance with the VA specifications, drawings, phasing plan and in compliance with any/all applicable Federal, State and Local regulations and requirements.
- B. The Contractor shall use the existing facilities in the building strictly within the limits indicated in contract documents as well as the approved pre-abatement work plan. Asbestos abatement drawings will show the limits of regulated areas; the placement of decontamination facilities; the temporary location of bagged waste ACM; the path of transport to outside the building; and the temporary waste storage area

for each building/regulated area. Any variation from the arrangements shown on drawings shall be secured in writing from the VA representative through the pre-abatement plan of action. .

1.2 VARIATIONS IN QUANTITY

- A. The quantities and locations of ACM as indicated on the drawings and the extent of work included in this section are estimated which are limited by the physical constraints imposed by occupancy of the buildings. Accordingly, minor variations (+/- 5%) in quantities of ACM within the regulated area are considered as having no impact on contract price and time requirements of this contract. Where additional work is required beyond the above variation, the contractor shall provide unit prices for newly discovered materials and those prices shall be used for additional work required under the contractor.

1.3 STOP ASBESTOS REMOVAL

- A. If the Contracting Officer; their field representative; or the VPIH/CIH presents a written **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and maintain HEPA filtered air flow and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the VA. A stop asbestos removal order may be issued at any time the VA determines abatement conditions/activities are not within specification requirements. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the industrial hygienist's time. The occurrence of any of the following events shall be reported immediately by the Contractor's competent person in writing to the VA representative and shall require the Contractor to immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:
- A. ≥ 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area;
 - B. breach/break in regulated area barrier(s);
 - C. less than -0.02 " WCG pressure in the regulated area;
 - D. serious injury/death at the site ;
 - E. fire/safety emergency at the site ;
 - F. respiratory protection system failure;
 - G. power failure or loss of wetting agent; or
 - H. any visible emissions observed outside the regulated area.

1.4 DEFINITIONS

1.4.1 GENERAL

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

1.4.2 GLOSSARY

Abatement - Procedures to control fiber release from asbestos-containing materials, typically during removal. Includes removal, encapsulation, enclosure, demolition and renovation activities related to asbestos.

ACE - Asbestos contaminated elements.

ACM - Asbestos containing material.

Aerosol - Solid or liquid particulate suspended in air.

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

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

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

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

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

Air monitoring - The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air.

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

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

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

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

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

Asbestos-containing waste material - Asbestos-containing material or asbestos contaminated objects requiring disposal.

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

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

Authorized visitor - Any person approved by the VA; the contractor; or any government agency having jurisdiction over the regulated area.

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

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

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

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

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

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

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

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

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

Certified Industrial Hygienist (CIH) - One certified in practice of industrial hygiene by the American Board of Industrial Hygiene. An industrial hygienist Certified in Comprehensive Practice by the American Board of Industrial Hygiene.

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

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

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

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

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

Competent person - In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.

Contractor's Professional Industrial Hygienist (CPIH) - The asbestos abatement contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of the PIH.

Count - Refers to the fiber count or the average number of fibers greater than five microns in length per cubic centimeter of air.

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

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

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

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

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

Drum - A rigid, impermeable container made of cardboard fiber, plastic, or metal which can be sealed in order to be siftproof, dustproof, and leaktight.

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

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

Encapsulation - Treating ACM with an encapsulant.

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

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

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

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

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

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

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

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

High efficiency particulate air (HEPA) filter - A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 microns or greater in diameter.

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

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

HVAC - Heating, Ventilation and Air Conditioning

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

Industrial hygienist technician - A person working under the direction of an IH or CIH who has special training, experience, certifications and licenses required for the industrial hygiene work assigned.

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

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

National Emission Standards for Hazardous Air Pollutants (NESHAP's) - EPA's rule to control emissions of asbestos to the environment.

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

Negative pressure - Air pressure which is lower than the surrounding area, created by exhausting air from a sealed regulated area through

HEPA equipped filtration units. OSHA requires maintaining -0.02" water column gauge inside the negative pressure enclosure.

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

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

Organic vapor cartridge - The type of cartridge used on air purifying respirators for organic vapor exposures.

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

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

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

Personal sampling/monitoring - Representative air samples obtained in the breathing zone of the person using a cassette and battery operated pump to determine asbestos exposure.

Permissible exposure limit (PEL) - The level of exposure OSHA allows for an 8 hour time weighted average. For asbestos fibers, the PEL is 0.1 fibers per cc.

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

Polyethylene sheeting - Strong plastic barrier material 4 to 6 mils thick, semi-transparent, sometimes flame retardant in compliance with NFPA 241.

Positive/negative fit check - A method of verifying the fit of a respirator by closing off the filters and breathing in or closing off the exhalation valve and breathing out while detecting leakage of the respirator.

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

PACM. The designation of PACM may be rebutted pursuant to 29 CFR 1926.1101 (k)(5).

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

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

Protection factor - A value assigned by OSHA/NIOSH to indicate the assigned protection a respirator should provide if worn properly. The number indicates the reduction of exposure level from outside to inside the respirator.

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

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

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

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

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

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

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

Shower room - The portion of the PDF where personnel shower before leaving the regulated area. Also used for bag/drum decontamination in the EDF.

Standard operating procedures (SOP's) - Asbestos work procedures required to be submitted by the contractor before work begins.

Supplied air respirator (SAR) - A respirator that utilizes an air supply separate from the air in the regulated area.

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

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

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

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

VA Industrial Hygienist (VPIH) - Department of Veterans Affairs Professional Industrial Hygienist.

VA Certified Industrial Hygienist (VPCIH) - Department of Veteran's Affairs Professional Certified Industrial Hygienist.

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

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

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

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

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

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

1.4.3 REFERENCED STANDARDS ORGANIZATIONS

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

- A. VA Department of Veterans Affairs
810 Vermont Avenue, NW
Washington, DC 20420
- B. AIHA American Industrial Hygiene Association
2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031
703-849-8888
- C. ANSI American National Standards Institute
1430 Broadway
New York, NY 10018
212-354-3300
- D. ASTM American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103
215-299-5400
- E. CFR Code of Federal Regulations
Government Printing Office
Washington, DC 20420
- F. CGA Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, VA 22202
703-979-0900
- G. CS Commercial Standard of the National Institute of Standards and Technology (NIST)
U. S. Department of Commerce
Government Printing Office
Washington, DC 20420
- H. EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460
202-382-3949
- I. MIL-STD Military Standards/Standardization Division
Office of the Assistant Secretary of Defense
Washington, DC 20420

- J. MSHA Mine Safety and Health Administration
Respiratory Protection Division
Ballston Tower #3
Department of Labor
Arlington, VA 22203
703-235-1452
- K. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000
- L. NEC National Electrical Code (by NFPA)
- M. NEMA National Electrical Manufacturer's Association
2101 L Street, N.W.
Washington, DC 20037

- N. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555
- O. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236
- P. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402
- Q. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800
- R. USA United States Army
Army Chemical Corps
Department of Defense
Washington, DC 20420

1.5 APPLICABLE CODES AND REGULATIONS

1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS

- A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.
- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these specification exists, the most stringent requirement(s) shall be utilized.
- C. Copies of all standards, regulations, codes and other applicable documents, including this specification and those listed in Section 1.5 shall be available at the worksite in the clean change area of the worker decontamination system.

1.5.2 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITY

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

1.5.3 FEDERAL REQUIREMENTS

- A. Federal requirements which govern of asbestos abatement include, but are not limited to, the following regulations.
- B. Occupational Safety and Health Administration (**OSHA**)
1. Title 29 CFR 1926.1101 - Construction Standard for Asbestos
 2. Title 29 CFR 1910.132 - Personal Protective Equipment
 3. Title 29 CFR 1910.134 - Respiratory Protection
 4. Title 29 CFR 1926 - Construction Industry Standards
 5. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
 6. Title 29 CFR 1910.1200 - Hazard Communication
 7. Title 29 CFR 1910.151 - Medical and First Aid
- C. Environmental Protection Agency (**EPA**):
1. 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
 2. 40 CFR 763.80 - Asbestos Hazard Emergency Response Act (AHERA)
- D. Department of Transportation (**DOT**)
- Title 49 CFR 100 - 185 - Transportation

1.5.4 STATE REQUIREMENTS

State requirements that apply to the asbestos abatement work, disposal, clearance, etc., include, but are not limited to, the following:

Illinois Department of Public Health (IDPH)

1. 105 ILCS 105: Illinois Asbestos Abatement Act

EPSTEIN 11270
VA 578-11-094
18MAY12
22NOV13 (A1)

02 82 11-15

2. 77 Ill. Adm. Code 855: Asbestos Abatement for Public and Private Schools and Commercial and Private Buildings in Illinois

1.5.5 LOCAL REQUIREMENTS

- A. If local city or county requirements are more stringent than federal or state standards, the local standards are to be followed.

1.5.6 STANDARDS

- A. Standards which govern asbestos abatement activities include, but are not limited to, the following:
 1. American National Standards Institute (ANSI) Z9.2-79 - Fundamentals Governing the Design and Operation of Local Exhaust Systems Z88.2 - Practices for Respiratory Protection.
 2. Underwriters Laboratories (UL) 586-90 - UL Standard for Safety of HEPA Filter Units, 7th Edition.
- B. Standards which govern encapsulation work include, but are not limited to the following:
 1. American Society for Testing and Materials (ASTM)
- C. Standards which govern the fire and safety concerns in abatement work include, but are not limited to, the following:
 1. National Fire Protection Association (NFPA) 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
 2. NFPA 701 - Standard Methods for Fire Tests for Flame Resistant Textiles and Film.
 3. NFPA 101 - Life Safety Code

1.5.7 EPA GUIDANCE DOCUMENTS

- A. EPA guidance documents which discuss asbestos abatement work activities are listed below. These documents are made part of this section by reference. EPA publications can be ordered from (800) 424-9065.
- B. Guidance for Controlling ACM in Buildings (Purple Book) EPA 560/5-85-024
- C. Asbestos Waste Management Guidance EPA 530-SW-85-007
- D. A Guide to Respiratory Protection for the Asbestos Abatement Industry EPA-560-OPTS-86-001
- E. Guide to Managing Asbestos in Place (Green Book) TS 799 20T July 1990

1.5.8 NOTICES

- A. State and Local agencies: Send written notification as required by state and local regulations including the local fire department prior to beginning any work on ACM as follows:

- B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification is given to EPA, State, and Local authorities.

1.5.9 PERMITS/LICENSES

- A. The contractor shall apply for and have all required permits and licenses to perform asbestos abatement work as required by Federal, State (IDPH), and Local regulations.

1.5.10 POSTING AND FILING OF REGULATIONS

- A. Maintain two (2) copies of applicable federal, state, and local regulations. 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 copy in the Contractor's office.

1.5.11 VA RESPONSIBILITIES

Prior to commencement of work:

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

1.5.12 SITE SECURITY

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately notify the VA.

- C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area must record their name, affiliation, time in, and time out for each entry.
- D. Access to the regulated area shall be through a single decontamination unit. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside, however, they shall be sealed with poly sheeting and taped until needed.
- 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 security/police guards.

1.5.13 EMERGENCY ACTION PLAN AND ARRANGEMENTS

- A. An Emergency Action Plan shall be developed by prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a);(b).
- B. Emergency procedures shall be in written form and prominently posted in the clean room and equipment room of the decontamination unit. Everyone, prior to entering the regulated area, must read and sign these procedures to acknowledge understanding of the regulated area layout, location of emergency exits and emergency procedures.
- C. Emergency planning shall include written notification of police, fire, and emergency medical personnel of planned abatement activities; work schedule; layout of regulated area; and access to the regulated area, particularly barriers that may affect response capabilities.
- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.

- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
 - 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
 - 2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.
- F. Telephone numbers of any/all emergency response personnel shall be prominently posted in the clean room, along with the location of the nearest telephone.
- G. The Contractor shall provide verification of first aid/CPR training for personnel responsible for providing first aid/CPR. OSHA requires medical assistance within 3-4 minutes of a life-threatening injury/illness. Bloodborne Pathogen training shall also be verified for those personnel required to provide first aid/CPR.
- H. The Emergency Action Plan shall provide for a Contingency Plan in the event that an incident occurs that may require the modification of the standard operating procedures during abatement. Such incidents include, but are not limited to, fire; accident; power failure; negative pressure failure; and supplied air system failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that asbestos abatement work is stopped and wetting is continued until correction of the problem.

1.5.14 PRE-CONSTRUCTION MEETING

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

- A. Proof of Contractor licensing.
- B. Proof the Competent Person(s) is trained and accredited and approved for working in this State. Verification of the experience of the Competent Person(s) shall also be presented.

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

K. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1910.1200.

1.6 PROJECT COORDINATION

The following are the minimum administrative and supervisory personnel necessary for coordination of the work.

1.6.1 PERSONNEL

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

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accreditation card with color picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.

C. Minimum qualifications for Contractor and assigned personnel are:

1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; has adequate materials, equipment and supplies to perform the work.
- A1 2. The Competent Person has three (3) 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; 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.
- A1 3. The Contractor Professional Industrial Hygienist (CPIH) shall have three (3) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete standard operating procedure for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.
4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

1.7 RESPIRATORY PROTECTION**1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM**

- A. The Contractor shall develop and implement a Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.132;134. ANSI Standard Z88.2-1992 provides excellent guidance for developing a respiratory protection program. All respirators used must be NIOSH approved for asbestos abatement activities. The written respiratory protection shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1)(i - ix) - Respiratory Protection Program.

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

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

1.7.3 SELECTION AND USE OF RESPIRATORS

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

1.7.4 MINIMUM RESPIRATORY PROTECTION

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

1.7.5 MEDICAL WRITTEN OPINION

- A. No employee shall be allowed to wear a respirator unless a physician has determined they are capable of doing so and has issued a current written opinion for that person.

1.7.6 RESPIRATOR FIT TEST

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

1.7.7 RESPIRATOR FIT CHECK

- A. The Competent Person shall assure that the positive/negative fit check is done each time the respirator is donned by an employee. Headcoverings must cover respirator headstraps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a fit check shall preclude that person from wearing a respirator until resolution of the problem.

1.7.8 MAINTENANCE AND CARE OF RESPIRATORS

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

1.7.9 SUPPLIED AIR SYSTEMS

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

1.8 WORKER PROTECTION**1.8.1 TRAINING OF ABATEMENT PERSONNEL**

- A. Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site.

1.8.2 MEDICAL EXAMINATIONS

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

1.8.3 PERSONAL PROTECTIVE EQUIPMENT

- A. Provide whole body clothing, head coverings, gloves and foot coverings and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle.

1.8.4 REGULATED AREA ENTRY PROCEDURE

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

1.8.5 DECONTAMINATION PROCEDURE - PAPR

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

of the unit; c) thoroughly decontaminate blower and hoses; d) carefully decontaminate battery pack with a wet rag being cautious of getting water in the battery pack thus preventing destruction. **(THIS PROCEDURE IS NOT A SUBSTITUTE FOR RESPIRATOR CLEANING!)**.

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

1.8.6 REGULATED AREA REQUIREMENTS

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

1.9 DECONTAMINATION FACILITIES

1.9.1 DESCRIPTION

- A. Provide each regulated area with separate personnel (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.

1.9.2 GENERAL REQUIREMENTS

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

1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF

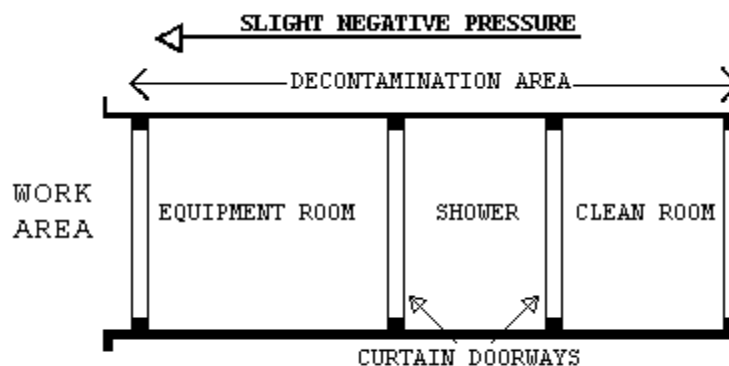
- A. The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention must be provided at the point of connection to the VA system. Water supply must be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary overhead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

1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)

- 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 insure all employees can complete the entire decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.
1. Clean Room: The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 3 layers of 6 mil opaque fire retardant poly to provide an air tight room. Provide a minimum of 2 - 900 mm (3 foot) wide 6 mil poly opaque fire retardant doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. Provide 1 storage locker per person. A portable fire extinguisher, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at

- both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.
2. Shower Room: The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using air tight walls made from at least 3 layers of 6 mil opaque fire retardant poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Waste water will be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters will be changed a minimum of daily or more often as needed. Filter changes must be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.
 3. Equipment Room: The Competent Person shall provide an equipment room which shall be an air tight compartment for the storage of work equipment/tools, reusable personal protective equipment, except for a respirator and for use as a gross decontamination area for personnel exiting the regulated area. The equipment room shall be separated from the regulated area by a minimum 3 foot wide door made with 2 layers of 6 mil opaque fire retardant poly. The equipment room shall be separated from the regulated area, the shower room and the rest of the building by air tight walls and ceiling constructed of a minimum of 3 layers of 6 mil opaque fire retardant poly. Damp wipe all surfaces of the equipment room after each shift change. Provide an additional loose layer of 6 mil fire retardant poly per shift change and remove this layer after each shift. If needed, provide a temporary electrical sub-panel equipped with GFCI in the equipment room to accommodate any equipment required in the regulated area.

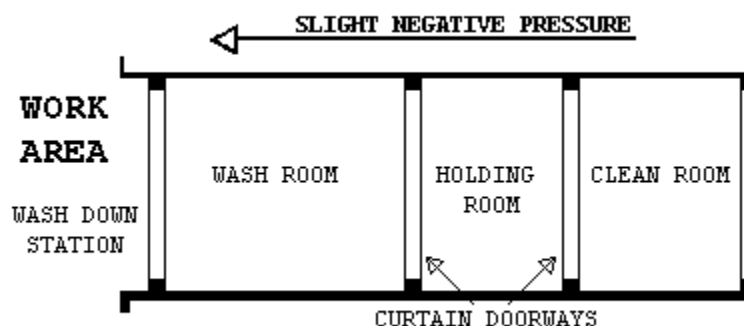
4. The PDF shall look like as follows: Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF is minimum of 2 layers of 6 mil opaque fire retardant poly.



1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)

- A. The Competent Person shall provide an W/EDF consisting of a wash room, holding room, and clean room for removal of waste, equipment and contaminated material from the regulated area. Personnel shall not enter or exit the W/EDF except in the event of an emergency. Clean debris and residue in the W/EDF daily. All surfaces in the W/EDF shall be wiped/hosed down after each shift and all debris shall be cleaned from the shower pan. The W/EDF shall consist of the following:
1. Wash Down Station: Provide an enclosed shower unit in the regulated area just outside the Wash Room as an equipment bag and container cleaning station.
 2. Wash Room: Provide a wash room for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the wash room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. Locate the wash room so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the wash room shall be constructed of 2 layers of 6 mil fire retardant poly.
 3. Holding Room: Provide a holding room as a drop location for bagged materials passed from the wash room. Construct the holding room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. The holding room shall be located so that bagged material cannot be passed from the wash room to the clean room unless

- it goes through the holding room. Doorways in the holding room shall be constructed of 2 layers of 6 mil fire retardant poly.
4. Clean Room: Provide a clean room to isolate the holding room from the exterior of the regulated area. Construct the clean room using 2 x 4 wood framing and 2 layers of 6 mil fire retardant poly. The clean room shall be located so as to provide access to the holding room from the building exterior. Doorways to the clean room shall be constructed of 2 layers of 6 mil fire retardant poly. When a negative pressure differential system is used, a rigid enclosure separation between the W/EDF clean room and the adjacent areas shall be provided.
 5. The W/EDF shall be provided as follows: Wash Room leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



1.9.6 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES

- A. At washdown station in the regulated area, thoroughly wet clean contaminated equipment and/or sealed polyethylene bags and pass into Wash Room after visual inspection. When passing anything into the Wash Room, close all doorways of the W/EDF, other than the doorway between the washdown station and the Wash Room. Keep all outside personnel clear of the W/EDF. Once inside the Wash Room, wet clean the equipment and/or bags. After cleaning and inspection, pass items into the Holding Room. Close all doorways except the doorway between the Holding Room and the Clean Room. Workers from the Clean Room/Exterior shall enter the Holding Room and remove the decontaminated/cleaned equipment/bags for removal and disposal. These personnel will not be required to wear PPE. At no time shall personnel from the clean side be allowed to enter the Wash Room.

PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT**2.1 MATERIALS AND EQUIPMENT****2.1.1 GENERAL REQUIREMENTS**

- 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. Work shall not start unless the following items have been delivered to the site and the CPIH has submitted verification to the VA's representative.
- B. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).

- C. 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 materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated area until abatement is completed.
- D. 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 place.
- E. 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.
- F. 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-mils shall be used in widths selected to minimize the frequency of joints. Fire retardant poly shall be used throughout.
- G. The method of attaching polyethylene sheeting shall be agreed upon in advance by the Contractor and the VA and selected to minimize damage to equipment and surfaces. Method of attachment may include any combination of moisture resistant duct tape furring strips, spray glue, staples, nails, screws, lumber and plywood for enclosures or other effective procedures capable of sealing polyethylene to dissimilar finished or unfinished surfaces under both wet and dry conditions.
- H. Polyethylene sheeting utilized for the PDF shall be opaque white or black in color, 6 mil fire retardant poly.
- I. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and waste water filtration system shall be provided by the Contractor.
- J. 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.
- K. 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).

- L. Disposal bags - 2 layers of 6 mil, for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
- M. The VA shall be provided a copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication. Chlorinated compounds shall not be used with any spray adhesive or other product. Appropriate encapsulant(s) shall be provided.
- N. 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.
- O. 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 hazard assessment conducted under 29 CFR 1910.132(d).

2.1.2 NEGATIVE PRESSURE FILTRATION SYSTEM

- A. The Contractor shall provide enough HEPA negative air machines to completely exchange the regulated area air volume 4 times per hour. The Competent Person shall determine the number of units needed for the regulated area by dividing the cubic feet in the regulated area by 15 and then dividing that result by the cubic feet per minute (CFM) for each unit to determine the number of units needed to effect 4 air changes per hour. Provide a standby unit in the event of machine failure and/or emergency in an adjacent area.

NIOSH has done extensive studies and has determined that negative air machines typically operate at ~50% efficiency. The contractor shall consider this in their determination of number of units needed to provide 4 air changes per hour. The contractor shall use 8 air changes per hour or double the number of machines based on their calculations or submit proof their machines operate at stated capacities at a 2" pressure drop across the filters.

2.1.3 DESIGN AND LAYOUT

- A. Before start of work submit the design and layout of the regulated area and the negative air machines. The submittal shall indicate the number of, location of and size of negative air machines. The point(s) of exhaust, air flow within the regulated area, anticipated negative pressure differential, and supporting calculations for sizing shall be provided. In addition, submit the following:

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1. Method of supplying power to the units and designation/location of the panels.
2. Description of testing method(s) for correct air volume and pressure differential.
3. If auxiliary power supply is to be provided for the negative air machines, provide a schematic diagram of the power supply and manufacturer's data on the generator and switch.

2.1.4 NEGATIVE AIR MACHINES (HEPA UNITS)

- A. Negative Air Machine Cabinet: The cabinet shall be constructed of steel or other durable material capable of withstanding potential damage from rough handling and transportation. The width of the cabinet shall be less than 30" in order to fit in standard doorways. The cabinet must be factory sealed to prevent asbestos fibers from being released during use, transport, or maintenance. Any access to and replacement of filters shall be from the inlet end. The unit must be on casters or wheels.
- B. Negative Air Machine Fan: The rating capacity of the fan must indicate the CFM under actual operating conditions. Manufacturer's typically use "free-air" (no resistance) conditions when rating fans. The fan must be a centrifugal type fan.
- C. Negative Air Machine Final Filter: The final filter shall be a HEPA filter. The filter media must be completely sealed on all edges within a structurally rigid frame. The filter shall align with a continuous flexible gasket material in the negative air machine housing to form an air tight seal. Each HEPA filter shall be certified by the manufacturer to have an efficiency of not less than 99.97% when challenged with 0.3 μm dioctylphthalate (DOP) particles. Testing shall have been done in accordance with Military Standard MIL-STD-282 and Army Instruction Manual 136-300-175A. Each filter must bear a UL586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
- D. Negative Air Machine Pre-filters: The pre-filters, which protect the final HEPA filter by removing larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. A first stage pre-filter shall be a low efficiency type for particles 10 μm or larger. A second stage pre-filter shall have a medium efficiency effective for particles down to 5 μm or larger. Pre-filters shall be installed either on or in the intake opening of the NAM and the

second stage filter must be held in place with a special housing or clamps.

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- E. Negative Air Machine Instrumentation: Each unit must be equipped with a gauge to measure the pressure drop across the filters and to indicate when filters have become loaded and need to be changed. A table indicating the cfm for various pressure readings on the gauge shall be affixed near the gauge for reference or the reading shall indicate at what point the filters shall be changed, noting cfm delivery. The unit must have an elapsed time meter to show total hours of operation.
- F. Negative Air Machine Safety and Warning Devices: An electrical/mechanical lockout must be provide to prevent the fan from being operated without a HEPA filter. Units must be equipped with an automatic shutdown device to stop the fan in the event of a rupture in the HEPA filter or blockage in the discharge of the fan. Warning lights are required to indicate normal operation; too high a pressure drop across filters; or too low of a pressure drop across filters.
- G. Negative Air Machine Electrical: All electrical components shall be approved by the National Electrical Manufacturer's Association (NEMA) and Underwriter's Laboratories (UL). Each unit must be provided with overload protection and the motor, fan, fan housing, and cabinet must be grounded.

2.1.5 PRESSURE DIFFERENTIAL

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

2.1.6 MONITORING

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

2.1.7 AUXILIARY GENERATOR

- A. 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, the

generator must automatically start and supply power to a minimum of 50% of the negative air machines in operation.

2.1.8 SUPPLEMENTAL MAKE-UP AIR INLETS

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

2.1.9 TESTING THE SYSTEM

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

2.1.10 DEMONSTRATION OF THE NEGATIVE AIR PRESSURE SYSTEM

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

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

2.1.11 USE OF SYSTEM DURING ABATEMENT OPERATIONS

- A. Start units before beginning any disturbance of ACM occurs. After work begins, the units shall run continuously, maintaining 4 actual air changes per hour at a negative pressure differential of -0.02" water column gauge, for the duration of the work until a final visual clearance and final air clearance has been completed.

- B The negative air machines shall not be shut down for the duration of the project unless authorized by the VA, in writing.
- C. Abatement work shall begin at a location farthest from the units and proceed towards them. If an electric failure occurs, the Competent Person shall stop all abatement work and immediately begin wetting all exposed asbestos materials for the duration of the power outage. Abatement work shall not resume until power is restored and all units are operating properly again.
- D. The negative air machines shall continue to run after all work is completed and until a final visual clearance and a final air clearance has been completed for that regulated area.

2.1.12 DISMANTLING THE SYSTEM

- A. After completion of the final visual and final air clearance has been obtained by the VPIH/CIH, the units may be shut down. The units shall have been **completely decontaminated**, all pre-filters removed and disposed of as asbestos waste, asbestos labels attached and the units inlet/outlet sealed with 2 layers of 6 mil poly.

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

2.2.1 GENERAL

- A. Seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All surfaces in the regulated area must be covered to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated as a result of the work, shall immediately stop work and clean up the contamination at no additional cost to the VA. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section - FIRESTOPPING.

2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA

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

2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA

- A. Access to the regulated area is allowed only through the personnel decontamination facility (PDF). All other means of access shall be

eliminated and OSHA DANGER demarcation signs posted as required by OSHA. If the regulated area is adjacent to or within view of an occupied area, provide a visual barrier of 6 mil opaque fire retardant poly to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier must be solid and capable of withstanding the negative pressure.

2.2.4 CRITICAL BARRIERS

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

2.2.5 PRIMARY BARRIERS

- A. Cover the regulated area with two layers of 6 mil fire retardant poly on the floors and two layers of 4 mil fire retardant poly on the walls, unless otherwise directed in writing by the VA representative. Floor layers must form a right angle with the wall and turn up the wall at least 300 mm (12"). Seams must overlap at least 1800 mm (6') and must be spray glued and taped. Install sheeting so that layers can be removed independently from each other. Carpeting shall be covered with three layers of 6 mil poly. Corrugated cardboard sheets must be placed between the bottom and middle layers of poly. Mechanically support and seal with duct tape and glue all wall layers.
- B. If stairs and ramps are covered with 6 mil plastic, two layers must be used. Provide 19 mm (3/4") exterior grade plywood treads held in place with duct tape/glue on the plastic. Do not cover rungs or rails with any isolation materials.

2.2.6 SECONDARY BARRIERS

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

2.2.7 EXTENSION OF THE REGULATED AREA

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

2.2.8 FIRESTOPPING

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

2.3 MONITORING, INSPECTION AND TESTING**2.3.1 GENERAL**

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. The CPIH shall be responsible for and shall inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.
- B. The VA will employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH will perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform

continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.

- C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH with review and approval of the VPIH/CIH. An agreement between the CPIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

2.3.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT

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

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

2.3.3 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH

- A. The Contractor's CPIH 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 is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor's personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in air sampling and analysis. The IH Technician shall have a NIOSH 582 Course or equivalent and show proof. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA/State Contractor/Supervisor and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation. The analytic

laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT. A daily log documenting all OSHA requirements for air monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH. The log will contain, at a minimum, information on personnel or area sampled, 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 shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH responsibilities.

2.4 STANDARD OPERATING PROCEDURES

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

- A. Minimum Personnel Qualifications
- B. Emergency Action Plan/Contingency Plans and Arrangements
- C. Security and Safety Procedures
- D. Respiratory Protection/Personal Protective Equipment Program and Training
- E. Medical Surveillance Program and Recordkeeping
- F. Regulated Area Requirements - Containment Barriers/Isolation of Regulated Area
- G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
- H. Negative Pressure Systems Requirements
- I. Monitoring, Inspections, and Testing
- J. Removal Procedures for ACM
- K. Removal of Contaminated Soil (if applicable)

- L. Encapsulation Procedures for ACM
- M. Disposal of ACM waste/equipment
- N. Regulated Area Decontamination/Clean-up
- O. Regulated Area Visual and Air Clearance
- P. Project Completion/Closeout

2.5 SUBMITTALS

2.5.1 PRE-START MEETING SUBMITTALS

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

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Standard Operating Procedures developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH.
- D. Submit the specifics of the materials and equipment to be used for this project with brand names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
 - 1. Supplied air system, if used, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.
 - 2. Waste water filtration system, shower system, containment barriers.
 - 3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, fire extinguishers.
 - 4. Respirators, protective clothing, personal protective equipment.
 - 5. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.

- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
 2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; Resolution
 3. List asbestos regulatory citations, penalties, damages paid and legal actions taken against the company in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
1. CPIH: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of SOP's developed; medical opinion; current respirator fit test.
 2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training;

- maximum number of personnel supervised on a project; medical opinion; current respirator fit test.
- 3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion; current respirator fit test.
- J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain english the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of SOP's incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who does and how is air monitoring conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and standard operating procedures; copies of monitoring results of the five referenced projects listed and analytical method(s) used.
- K. Rented equipment must be decontaminated prior to returning to the rental agency.
- L. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants and the MSDS. Provide application instructions also.

2.5.2 SUBMITTALS DURING ABATEMENT

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWA's/EL's. Submit this information daily to the VPIH/CIH.
- B. The CPIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work.
 - 1. Removal of any poly barriers.
 - 2. Visual inspection/testing by the CPIH prior to application of lockdown.
 - 3. Packaging and removal of ACM waste from regulated area.
 - 4. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the VA's representative on a weekly basis.

2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT

The CPIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. The report shall include a certificate of completion, signed and dated by the CPIH, in accordance with Attachment #1. All clearance and perimeter samples must be submitted. The VA Representative will retain the abatement report after completion of the project.

2.6 ENCAPSULANTS

2.6.1 TYPES OF ENCAPSULANTS

- A. The following four types of encapsulants, if used, must comply with performance requirements as stated in paragraph 2.6.2:
 - 1. Removal encapsulant - used as a wetting agent to remove ACM.
 - 2. Bridging encapsulant - provides a tough, durable coating on ACM.
 - 3. Penetrating encapsulant - penetrates/encapsulates ACM at least 13 mm (1/2").
 - 4. Lockdown encapsulant - seals microscopic fibers on surfaces after ACM removal.

2.6.2 PERFORMANCE REQUIREMENTS

Encapsulants shall meet the latest requirements of EPA; shall not contain toxic or hazardous substances; or solvents; and shall comply with the following performance requirements:

- A. General Requirements for all Encapsulants:
 - 1. ASTM E84: Flame spread of 25; smoke emission of 50.
 - 2. University of Pittsburgh Protocol: Combustion Toxicity; zero mortality.
 - 3. ASTM C732: Accelerated Aging Test; Life Expectancy - 20 years.
 - 4. ASTM E96: Permeability - minimum of 0.4 perms.
- B. Bridging/Penetrating Encapsulants:
 - 1. ASTM E736: Cohesion/Adhesion Test - 24 kPa (50 lbs/ft²).
 - 2. ASTM E119: Fire Resistance - 3 hours (Classified by UL for use on fibrous/cementitious fireproofing).
 - 3. ASTM D2794: Gardner Impact Test; Impact Resistance - minimum 11.5 kg-mm (43 in/lb).
 - 4. ASTM D522: Mandrel Bend Test; Flexibility - no rupture or cracking.
- C. Lockdown Encapsulants:
 - 1. ASTM E119: Fire resistance - 3 hours (tested with fireproofing over encapsulant applied directly to steel member).

2. ASTM E736: Bond Strength - 48 kPa (100 lbs/ft²) (test compatibility with cementitious and fibrous fireproofing).
3. In certain situations, encapsulants may have to be applied to hot pipes/equipment. The encapsulant must be able to withstand high temperatures without cracking or off-gassing any noxious vapors during application.

2.6.3 CERTIFICATES OF COMPLIANCE

- A. 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.

PART 3 - EXECUTION

3.1 PRE-ABATEMENT ACTIVITIES

3.1.1 PRE-ABATEMENT MEETING

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

3.1.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS

Before any work begins on the construction of the regulated area, the Contractor will:

- A. 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.
- B. The VA Representative, the Contractor, and the VPIH/CIH must be aware of 10/95 A/E Quality Alert indicating the failure to identify asbestos in the areas listed. Make sure these areas are looked at/reviewed on the

project: Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside chases/walls; transite piping/ductwork/sheets; behind radiators; roofing materials; below window sills; water/sewer lines; electrical conduit coverings; crawl spaces(previous abatement contamination); flooring/mastic covered by carpeting/new flooring; exterior insulated wall panels; on underground fuel tanks; steam line trench coverings.

- C. The abatement contractor shall ensure that all furniture, machinery, equipment, curtains, drapes, blinds, and other movable objects required to be removed from the regulated area have been cleaned and removed or properly protected from contamination.
- D. If present and required, remove and dispose of carpeting from floors in the regulated area.
- E. Inspect existing firestopping in the regulated area. Correct as needed.

3.1.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS

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

3.2 REGULATED AREA PREPARATIONS

- A. Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign

- and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.
- B. Shut down and lock out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.
 - C. Shut down and lock out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6-mil polyethylene disposal bags for staging and eventual disposal as asbestos waste.
 - D. The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.
 - E. The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention.
 - F. The Contractor shall 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 should be disposed of as asbestos contaminated waste. Cleaning these asbestos contaminated items utilizing HEPA vacuum techniques and off-premises steam cleaning is very difficult and cannot guarantee decontamination. Since adequate cleaning of contaminated fabrics is difficult, the VA will determine whether this option is an appropriate one. Carpeting will be disposed of prior to abatement if in the regulated area.
 - G. The abatement contractor shall Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention must be paid to machinery behind grills or gratings where access may be difficult but contamination may be significant. Also, pay particular attention to wall, floor and ceiling penetration behind fixed items. After precleaning, enclose fixed objects with 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 here along with specified means of protection. Contact the manufacturer for special protection requirements.

- H. The abatement contractor shall 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.

3.3 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA GENERAL:

Follow requirements of Section- Containment Barriers and Coverings.

3.4 REMOVAL OF ACM

3.4.1 WETTING ACM

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

3.4.2 SECONDARY BARRIER AND WALKWAYS

- A. 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 (3M) of the area where work is to be done. Secure the secondary barrier with duct tape to prevent 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.

- B. 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.

3.4.3 WET REMOVAL OF ACM

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

coat after scraping is done using a stiff bristle hand brush. If a removal encapsulant is used, remove residue completely before the encapsulant dries. Re-wet the substrate as needed to prevent drying before the residue is removed.

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

3.4.4 WET REMOVAL OF AMOSITE

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

- B. Amosite does not wet well with amended water. Submit full information/documentation on the wetting agent proposed prior to start for review and approval by the VA Representative. Insure that the material is worked on in small sections and is thoroughly and continuously wetted. Package as soon as possible while wet. Remove as required.

3.5 LOCKDOWN ENCAPSULATION

3.5.1 GENERAL

- A. Lockdown encapsulation is an integral part of the ACM removal. At the conclusion of ACM removal and before removal of the primary barriers, all surfaces shall be encapsulated with a bridging encapsulant.

3.5.2 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 MSDS for the material.

3.5.3 WORKER PROTECTION

- A. Before beginning work with any material for which an MSDS 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 used in addition to the HEPA filter when a solvent based encapsulant is used. The CPIH shall be responsible for provision of adequate respiratory protection.

3.5.4 ENCAPSULATION OF SCRATCH COAT PLASTER OR PIPING

- A. Apply two coats of encapsulant to the scratch coat plaster or piping after all ACM has been removed. Apply in strict accordance 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.
- B. Apply the encapsulant with an airless sprayer at a pressure and using a nozzle orifice as recommended by the manufacturer. Apply the first coat while the 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. Color the 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.

3.5.5 SEALING EXPOSED EDGES

- A. Seal edges of ACM exposed by removal work which is inaccessible, such as a sleeve, wall penetration, etc., with two coats of encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the encapsulant. Apply in accordance with 3.5.4 (B).

3.6 DISPOSAL OF ACM WASTE MATERIALS

3.6.1 GENERAL

- A. Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA and DOT. The landfill requirements for packaging must also be met. Disposal shall be done at an approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

3.6.2 PROCEDURES

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

needed, use a poly lined fiber drum as the second container, prior to disposal.

3.7 PROJECT DECONTAMINATION

3.7.1 GENERAL

- A. The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH.
- B. If the asbestos abatement work is in an area which was contaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal and cleanings of the surfaces of the regulated area after the primary barrier removal.
- C. If the asbestos abatement work is in an area which was uncontaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal, thus preventing contamination of the building when the regulated area critical barriers are removed.

3.7.2 REGULATED AREA CLEARANCE

- A. Air testing and other requirements which must be met before release of the Contractor and re-occupancy of the regulated area space are specified in Final Testing Procedures.

3.7.3 WORK DESCRIPTION

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

3.7.4 PRE-DECONTAMINATION CONDITIONS

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

3.7.5 FIRST CLEANING

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

3.7.6 PRE-CLEARANCE INSPECTION AND TESTING

- A. The CPIH and VPIH/CIH will perform a thorough and detailed visual inspection at the end of the cleaning to determine whether there is any visible residue in the regulated area. If the visual inspection is acceptable, the CPIH will perform pre-clearance sampling using aggressive clearance as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). If the sampling results show values below 0.01 f/cc, then the Contractor shall notify the VA's representative of the results with a brief report from the CPIH documenting the inspection and sampling results and a statement verifying that the regulated area is ready for lockdown encapsulation. The VA reserves the right to utilize their own VPIH/CIH to perform a pre-clearance inspection and testing for verification.

3.7.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES

- A. 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.

3.8 FINAL VISUAL INSPECTION AND AIR CLEARANCE TESTING

3.8.1 GENERAL

- A. Notify the VA representative 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing will be performed by the VPIH/CIH starting after the final cleaning.

3.8.2 FINAL VISUAL INSPECTION

- A. Final visual inspection will include the entire regulated area, the PDF, all poly sheeting, seals over HVAC openings, doorways, windows, and any

other openings. If any debris, residue, dust or any other suspect material is detected, the final cleaning shall be repeated at no cost to the VA. Dust/material samples may be collected and analyzed at no cost to the VA at the discretion of the VPIH/CIH to confirm visual findings. When the regulated area is visually clean the final testing can be done.

3.8.3 FINAL AIR CLEARANCE TESTING

- A. After an acceptable final visual inspection by the VPIH/CIH and VA Representative AE Project Engineer, the VPIH/CIH will perform the final testing. Air samples will be collected and analyzed in accordance with procedures for AHERA in this specification. If work is less than 260 lf/160 sf, 5 PCM samples may be collected for clearance. If work is equal to or more than 260 lf/160 sf, TEM sampling shall be done for clearance. TEM analysis shall be done in accordance with procedures in this specification. If the release 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.**
- B. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

3.8.4 FINAL AIR CLEARANCE PROCEDURES

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc as measured with PCM/TEM methods
- B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the VPIH/CIH will secure samples and analyze them according to the following procedures:
 1. Fibers Counted: "Fibers" referred to in this section shall be either all fibers regardless of composition as counted in the NIOSH 7400 PCM method or asbestos fibers counted using the AHERA TEM method.
 2. Aggressive Sampling: All final air testing samples shall be collected using aggressive sampling techniques except where soil is not encapsulated or enclosed. Samples will be collected on 0.8µ MCE filters for PCM analysis and 0.45µ Polycarbonate filters for TEM. A minimum of 1200 Liters of air shall be collected for clearance samples. Before pumps are started, initiate aggressive sampling as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). Air samples will be collected in areas subject to normal air

circulation away from corners, obstructed locations, and locations near windows, doors, or vents. After air sampling pumps have been shut off, circulating fans shall be shut off. The negative pressure system shall continue to operate.

3.8.5 CLEARANCE SAMPLING USING PCM - LESS THAN 260LF/160SF:

- A. The VPIH/CIH will perform clearance samples as indicated by the specification.
- B. The NIOSH 7400 PCM method will be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 5 PCM clearance samples shall be collected. All samples must be equal to or less than 0.01 f/cc to clear the regulated area.

3.8.6 CLEARANCE SAMPLING USING TEM - EQUAL TO OR MORE THAN 260LF/160SF: TEM

Clearance requires 13 samples be collected; 5 inside the regulated area; 5 outside the regulated area; and 3 field blanks.

3.8.7 LABORATORY TESTING OF PCM CLEARANCE SAMPLES

The services of an AIHA accredited laboratory will be employed by the VA to perform analysis for the air samples. Samples will be sent daily by the VPIH/CIH so that verbal/faxed reports can be received within 24 hours. A complete record, certified by the laboratory, of all air monitoring tests and results will be furnished to the VA's representative and the Contractor.

3.8.8 LABORATORY TESTING OF TEM SAMPLES

Samples shall be sent by the VPIH/CIH to an accredited laboratory for analysis by TEM. Verbal/faxed results from the laboratory shall be available within 24 hours after receipt of the samples. A complete record, certified by the laboratory, of all TEM results shall be furnished to the VA's representative and the Contractor.

3.9 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.9.1 COMPLETION OF ABATEMENT WORK

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

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

3.9.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

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

3.9.3 WORK SHIFTS

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

3.9.4 RE-INSULATION

- A. If required as part of the contract, replace all asbestos containing insulation/fire-proofing with suitable non-asbestos material. Provide MSDS's for all replacement materials. Refer to Section 23 07 11, HVAC AND PLUMBING INSULATION.

ATTACHMENT #1**CERTIFICATE OF COMPLETION**

DATE:

PROJECT NAME:

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 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 the negative pressure system was installed, operated and maintained in order to provide a minimum of 4 actual air changes per hour with a continuous -0.02" of water column pressure.

Signature/Date:

Signature/Date:

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ATTACHMENT #2

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME:

DATE:

PROJECT ADDRESS:

ABATEMENT CONTRACTOR'S NAME:

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

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

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

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

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

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

Signature:

Printed Name:

Social Security Number:

Witness:

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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. 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 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:

Date:

Printed Name of CPIH:

Signature of Contractor:

Date:

Printed Name of Contractor:

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

VA Project Location:

VA Project #:

VA Project Description:

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

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

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

Abatement Contractor Owner's Signature

Date

Abatement Contractor Competent Person(s)

Date

Date

Date

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Laboratory Results of Materials Sampled - Positive
Hines VA, Building 1 Library (Learning Center Project)

Material Description	Location of Material	Material Type TSI/Surf/Misc.	ACM Test Result
ALL PIPE INSULATION INCLUDING MUDDERED JOINT PACKING (MJP) ON ELBOWS, FITTINGS, AND/OR VALVES (EFV) EXCEPT FIBERGLASS	Throughout Library and Associated Rooms (above ceilings and behinds walls)	TSI	Positive
FLOOR TILE AND MASTIC (under the carpet)	Throughout Library and Associated Rooms (except mechanical room, toilets and kitchen/break room)	Misc.	Positive
12" x 12" Off white w/ Tan Streaks Vinyl Floor Tile (VFT) and Mastic	Women's Toilet (G100C-1), Men's Toilet (G100E-1) and Mechanical Room	Misc.	Positive
Exterior Window Caulk	Exterior Elevations	Misc.	Positive

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SECTION 02 82 13.13
GLOVEBAG ASBESTOS ABATEMENT

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PART 1 - GENERAL**1.1 SUMMARY OF THE WORK****1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS**

Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show the work to be done under the contract and related requirements and conditions impacting the project. Related requirements and conditions include applicable codes and regulations, notices and permits, existing site conditions and restrictions on use of the site, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work. In the event the Asbestos Abatement Contractor (Contractor) discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the Contracting Officer for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor without obtaining guidance from the Contracting Officer shall become the sole risk and responsibility of the Contractor. All cost incurred due to such action are also the responsibility of the Contractor.

1.1.2 EXTENT OF WORK

- A. Below is a brief description of the estimated quantities of asbestos containing materials to be abated by the glovebag method. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Contractor shall satisfy himself as the actual quantities to be abated. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents.
- B. Removal, clean-up and disposal of ACM piping and fittings and asbestos contaminated elements in an appropriate regulated area in the following approximate quantities;
 - 2200 linear feet of pipe insulation
 - 150 fittings elbows, joints on pipe

1.1.3 RELATED WORK

- A. Section 07 84 00; FIRESTOPPING.
- B. Section 02 41 00; DEMOLITION.
- C. Division 09; FINISHES.
- D. Division 22; PLUMBING.

- E. Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION, Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- F. Section 23 07 11, HVAC AND PLUMBING INSULATION.
- H. Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING, Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING, Section 22 11 00, FACILITY WATER DISTRIBUTION, Section 22 13 00, FACILITY SANITARY SEWERAGE.
- I. Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING.
- J. Section 23 31 00, HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.

1.1.1.4 TASKS

The work tasks are summarized briefly as follows:

- A. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, work-site preparations, emergency procedures arrangements, and standard operating procedures for glovebag asbestos abatement work.
- B. Abatement activities including removal, 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.

1.1.1.5 ABATEMENT CONTRACTOR USE OF PREMISES

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

1.2 VARIATIONS IN QUANTITY

- A. The quantities and locations of ACM as indicated on the drawings and the extent of work included in this section are estimates which are limited by the physical constraints imposed by occupancy of the buildings. Accordingly, minor variations (+/- 5%) in quantities of ACM within the regulated area are considered as having no impact on contract price and time requirements of this contract. Where additional work is required beyond the above variation, the Contractor shall provide unit prices for additional footage for newly discovered materials and those prices will be used for additional work under the contract.

1.3 STOP ASBESTOS REMOVAL

If the Contracting Officer or their field representative presents a written **Stop Asbestos Removal Order**, the Abatement Contractor/Personnel shall immediately stop all asbestos removal and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the VA. A stop asbestos removal order may be issued at any time the VA determines abatement conditions/activities are not within specification requirements. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the industrial hygienist's time. The occurrence of any of the following events shall be reported immediately by the Contractor in writing to the VA representative and shall require the Contractor to immediately stop asbestos removal activities and initiate fiber reduction activities:

- A. \geq 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area;
- B. breach/break in regulated area critical barrier(s)/floor;
- C. serious injury/death at the site;
- D. fire/safety emergency at the site;
- E. respiratory protection system failure;
- F. power failure or loss of wetting agent; or
- G. any visible emissions observed outside the regulated area.

1.4 DEFINITIONS

1.4.1 GENERAL

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

nature and not completely descriptive of the requirements indicated therein.

1.4.2 GLOSSARY

Abatement - Procedures to control fiber release from asbestos-containing materials, typically during removal. Includes removal, encapsulation, enclosure, demolition and renovation activities related to asbestos.

ACE - Asbestos contaminated elements.

ACM - Asbestos containing material.

Aerosol - Solid or liquid particulate suspended in air.

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

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

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

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

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

Air monitoring - The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air.

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

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

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

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

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

Asbestos-containing waste material - Asbestos-containing material or asbestos contaminated objects requiring disposal.

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

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

Authorized visitor - Any person approved by the VA; the contractor; or any government agency having jurisdiction over the regulated area.

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

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

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

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

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

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

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

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

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

Certified Industrial Hygienist (CIH) - One certified in practice of industrial hygiene by the American Board of Industrial Hygiene. An industrial hygienist Certified in Comprehensive Practice by the American Board of Industrial Hygiene.

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

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

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

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

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

Competent person - In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.

Contractor's Professional Industrial Hygienist (CPIH) - The Contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of the PIH.

Count - Refers to the fiber count or the average number of fibers greater than five microns in length per cubic centimeter of air.

Decontamination area/unit - An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

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

Disposal bag - Typically 6 mil thick siftproof, dustproof, leaktight container used to package and transport asbestos waste from regulated

areas to the approved landfill. Each bag/container must be labeled/marked in accordance with EPA, OSHA and DOT requirements.

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

Drum - A rigid, impermeable container made of cardboard fiber, plastic, or metal which can be sealed in order to be siftproof, dustproof, and leaktight.

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

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

Encapsulation - Treating ACM with an encapsulant.

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

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

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

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

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

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

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

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

High efficiency particulate air (HEPA) filter - A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 microns or greater in diameter.

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

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

HVAC - Heating, Ventilation and Air Conditioning

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

Industrial hygienist technician - A person working under the direction of an IH or CIH who has special training, experience, certifications and licenses required for the industrial hygiene work assigned.

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

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

National Emission Standards for Hazardous Air Pollutants (NESHAP's) - EPA's rule to control emissions of asbestos to the environment.

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

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

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

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

Organic vapor cartridge - The type of cartridge used on air purifying respirators for organic vapor exposures.

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

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

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

Personal sampling/monitoring - Representative air samples obtained in the breathing zone of the person using a cassette and battery operated pump to determine asbestos exposure.

Permissible exposure limit (PEL) - The level of exposure OSHA allows for an 8 hour time weighted average. For asbestos fibers, the PEL is 0.1 fibers per cc.

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

Polyethylene sheeting - Strong plastic barrier material 4 to 6 mils thick, semi-transparent, sometimes flame retardant in compliance with NFPA 241.

Positive/negative fit check - A method of verifying the fit of a respirator by closing off the filters and breathing in or closing off the exhalation valve and breathing out while detecting leakage of the respirator.

Presumed ACM (PACM) - Thermal system insulation, surfacing, and flooring material installed in buildings prior to 1981. If the building owner has actual knowledge, or should have known through the exercise of due diligence that other materials are ACM, they too must be treated as PACM. The designation of PACM may be rebutted pursuant to 29 CFR 1926.1101 (k)(5).

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

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

Protection factor - A value assigned by OSHA/NIOSH to indicate the assigned protection a respirator should provide if worn properly. The number indicates the reduction of exposure level from outside to inside the respirator.

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

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

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

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

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

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

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

Shower room - The portion of the PDF where personnel shower before leaving the regulated area. Also used for bag/drum decontamination in the EDF.

Standard operating procedures (SOP's) - Asbestos work procedures required to be submitted by the contractor before work begins.

Supplied air respirator (SAR) - A respirator that utilizes an air supply separate from the air in the regulated area.

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

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

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

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

VA Industrial Hygienist (VPIH/CIH) - Department of Veterans Affairs Professional Industrial Hygienist.

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

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

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

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

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

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

1.4.3 REFERENCED STANDARDS ORGANIZATIONS

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

- A. VA Department of Veterans Affairs
810 Vermont Avenue, NW
Washington, DC 20420
- B. AIHA American Industrial Hygiene Association
2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031
703-849-8888
- C. ANSI American National Standards Institute
1430 Broadway
New York, NY 10018
212-354-3300
- D. ASTM American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103
215-299-5400

- E. CFR Code of Federal Regulations
Government Printing Office
Washington, DC 20420
- F. CGA Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, VA 22202
703-979-0900
- G. CS Commercial Standard of the National Institute of Standards and Technology(NIST)
U. S. Department of Commerce
Government Printing Office
Washington, DC 20420
- H. EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460
202-382-3949
- I. MIL-STD Military Standards/Standardization Division
Office of the Assistant Secretary of Defense

Washington, DC 20420
- J. MSHA Mine Safety and Health Administration
Respiratory Protection Division
Ballston Tower #3
Department of Labor
Arlington, VA 22203
703-235-1452
- K. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000
- L. NEC National Electrical Code (by NFPA)
- M. NEMA National Electrical Manufacturer's Association
2101 L Street, NW
Washington, DC 20037
- N. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555

- O. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236
- P. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402
- Q. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800
- R. USA United States Army
Army Chemical Corps
Department of Defense
Washington, DC 20420

1.5 APPLICABLE CODES AND REGULATIONS

1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS

- A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.
- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these specification exists, the most stringent requirement(s) shall be utilized.
- C. Copies of all standards, regulations, codes and other applicable documents, including this specification and those listed in Section 1.5 shall be available at the worksite in the clean change area of the worker decontamination system.

1.5.2 CONTRACTOR RESPONSIBILITY

- A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to any and all aspects of the abatement project. The contractor is responsible for providing and maintaining training, accreditation, medical exams, medical records, personal protective equipment as required by applicable Federal, State and Local regulations. The contractor shall hold the VA and VPIH/CIH consultants harmless for any

failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of himself, his employees, or his subcontractors. The contractor will incur all costs of the CPIH, including all sampling/analytical costs to assure compliance with OSHA/EPA/State requirements.

1.5.3 FEDERAL REQUIREMENTS

Federal requirements which govern some aspect of asbestos abatement include, but are not limited to, the following regulations.

- A. Occupational Safety and Health Administration (**OSHA**)
 - 1. Title 29 CFR 1926.1101 - Construction Standard for Asbestos
 - 2. Title 29 CFR 1910.132 - Personal Protective Equipment
 - 3. Title 29 CFR 1910.134 - Respiratory Protection
 - 4. Title 29 CFR 1926 - Construction Industry Standards
 - 5. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
 - 6. Title 29 CFR 1910.1200 - Hazard Communication
 - 7. Title 29 CFR 1910.151 - Medical and First Aid
- B. Environmental Protection Agency (**EPA**)
 - 1. 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
 - 2. 40 CFR 763.80 - Asbestos Hazard Emergency Response Act (AHERA)
- C. Department of Transportation (**DOT**)
 - Title 49 CFR 100 - 185 - Transportation

1.5.4 STATE REQUIREMENTS:

State requirements that apply to the asbestos abatement work, disposal, clearance, etc., include, but are not limited to, the following:

- A. Illinois Department of Public Health (IDPH)
 - 1. 105 ILCS 105: Illinois Asbestos Abatement Act
 - 2. 77 Ill. Adm. Code 855: Asbestos Abatement for Public and Private Schools and Commercial and Private Buildings in Illinois

1.5.5 LOCAL REQUIREMENTS

If the county or local requirements are more stringent than federal or state standards, the local standards are to be followed.

1.5.6 STANDARDS

- A. Standards which govern asbestos abatement activities include, but are not limited to, the following:
 - 1. American National Standards Institute (ANSI) Z9.2-79 - Fundamentals Governing the Design and Operation of Local Exhaust Systems Z88.2 - Practices for Respiratory Protection.

2. Underwriters Laboratories (UL)586-90 - UL Standard for Safety of HEPA filter Units, 7th Edition.
- B. Standards which govern encapsulation work include, but are not limited to, the following:
 1. American Society for Testing and Materials (ASTM)
- C. Standards which govern the fire and safety concerns in abatement work include, but are not limited to, the following:
 1. National Fire Protection Association (NFPA) 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
 2. NFPA 701 - Standard Methods for Fire Tests for Flame Resistant Textiles and Film.
 3. NFPA 101 - Life Safety Code

1.5.7 EPA GUIDANCE DOCUMENTS

- A. EPA guidance documents which discuss asbestos abatement work activities are listed below. These documents are made part of this section by reference. EPA publications can be ordered from (800) 424-9065.
- B. Guidance for Controlling ACM in Buildings (Purple Book) EPA 560/5-85-024
- C. Asbestos Waste Management Guidance EPA 530-SW-85-007.
- D. A Guide to Respiratory Protection for the Asbestos Abatement Industry EPA-560-OPTS-86-001
- E. Guide to Managing Asbestos in Place (Green Book) TS 799 20T July 1990

1.5.8 NOTICES

- A. State and Local agencies: Send written notification as required by state and local regulations including the local fire department prior to beginning any work on ACM as follows:
- B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification is given to EPA, State, and Local authorities.

1.5.9 PERMITS/LICENSES

The contractor shall apply for and have all required permits and licenses to perform asbestos abatement work as required by Federal, State, and Local regulations.

1.5.10 POSTING AND FILING OF REGULATIONS

Maintain two (2) copies of applicable federal, state, and local regulations. Post one copy of each at the regulated area where workers will have daily access to the regulations and keep another copy in the Contractor's office.

1.5.11 VA RESPONSIBILITIES

Prior to commencement of work:

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

1.5.12 SITE SECURITY

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately notify the VA.
- 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, if required. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside, however, they shall be sealed with poly sheeting and taped until needed.

- 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 Abatement 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 security guards.

1.5.13 EMERGENCY ACTION PLAN AND ARRANGEMENTS

- A. An Emergency Action Plan shall be developed by the Contractor prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a);(b).
- B. Emergency procedures shall be in written form and prominently posted and available in the regulated area. 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 and layout of regulated area, particularly barriers that may affect response capabilities.
- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
 - 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
 - 2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.

- F. Telephone numbers of 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 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; and power failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that work is stopped and wetting is continued until correction of the problem.

1.5.14 PRE-CONSTRUCTION MEETING

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

- A. Proof of Contractor licensing.
- B. Proof the Competent Person is trained and accredited and approved for working in this State. Verification of the experience of the Competent Person shall also be presented.
- C. A list of all workers who will participate in the project, including experience and verification of training and accreditation.
- D. A list of and verification of training for all personnel who have current first-aid/CPR training. A minimum of one person per shift must have adequate training.
- E. Current medical written opinions for all personnel working on-site meeting the requirements of 29 CFR 1926.1101 (m).
- F. Current fit-tests for all personnel wearing respirators on-site meeting the requirements of 29 CFR 1926.1101 (h) and Appendix C.
- G. A copy of the Contractor's Standard Operating Procedures for Class I Glovebag Asbestos Abatement. In these procedures, the following information must be detailed, specific for this project.
 - 1. Regulated area preparation procedures;

2. Notification requirements procedure of Contractor as required in 29 CFR 1926.1101 (d);
3. If required, decontamination area set-up/layout and decontamination procedures for employees;
4. Glovebag abatement methods/procedures and equipment to be used;
5. Personal protective equipment to be used;
- H. At this meeting the Contractor shall provide all submittals as required.
- I. Procedures for handling, packaging and disposal of asbestos waste.
- J. Emergency Action Plan and Contingency Plan Procedures.

1.6 PROJECT COORDINATION

The following are the minimum administrative and supervisory personnel necessary for coordination of the work.

1.6.1 PERSONNEL

- A. Administrative and supervisory personnel shall consist of a qualified Competent Person as defined by OSHA in the Construction Standards and the Asbestos Construction Standard; Contractor Professional Industrial Hygienist and Industrial Hygiene Technicians. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements.
- B. Non-supervisory personnel shall consist of an adequate number of qualified personnel to meet the schedule requirements of the project. Personnel shall meet required qualifications. Personnel utilized on-site shall be pre-approved by the VA representative. A request for approval shall be submitted for any person to be employed during the project giving the person's name; social security number; qualifications; accreditation card with picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.
- C. Minimum qualifications for Contractor and assigned personnel are:
 1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; has adequate materials, equipment and supplies to perform the work.

2. The Competent Person has four (4) years of abatement experience of which two (2) years were as the Competent Person on the project; meets the OSHA definition of a Competent Person; has been the Competent Person on two (2) projects of similar size and complexity as this project; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.
3. The Contractor Professional Industrial Hygienist (CPIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete standard operating procedure for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.
4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

- A. The Contractor shall develop and implement a Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.132;134. ANSI Standard Z88.2-1992 provides excellent guidance for developing a respiratory protection program All respirators used must be NIOSH approved for asbestos abatement activities. The written respiratory protection shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1)(i - ix) - Respiratory Protection Program.

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

- A. The Respiratory Protection Program Coordinator (RPPC) must be identified and shall have two (2) years experience coordinating the program. The RPPC must provide a signed statement attesting to the fact that the program meets the above requirements.

1.7.3 SELECTION AND USE OF RESPIRATORS

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

1.7.4 MINIMUM RESPIRATORY PROTECTION

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

1.7.5 MEDICAL WRITTEN OPINION

- A. No employee shall be allowed to wear a respirator unless a physician has determined they are capable of doing so and has issued a written opinion for that person.

1.7.6 RESPIRATOR FIT TEST

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

1.7.7 RESPIRATOR FIT CHECK

- A. The Competent Person shall assure that the positive/negative fit check is done each time the respirator is donned by an employee. Headcoverings must cover respirator headstraps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a fit check shall preclude that person from wearing a respirator until resolution of the problem.

1.7.8 MAINTENANCE AND CARE OF RESPIRATORS

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

1.8 WORKER PROTECTION**1.8.1 TRAINING OF ABATEMENT PERSONNEL**

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

minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site.

1.8.2 MEDICAL EXAMINATIONS

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

1.8.3 PERSONAL PROTECTIVE EQUIPMENT

- A. Provide whole body clothing, head coverings, foot coverings and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle.

1.8.4 REGULATED AREA ENTRY PROCEDURE

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

1.8.5 DECONTAMINATION PROCEDURE - PAPR

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

- A. When exiting the regulated area, remove disposable coveralls, and ALL other clothes, disposable head coverings, and foot coverings or boots in the equipment room.
- B. Still wearing the respirator and completely naked, proceed to the shower. Showering is MANDATORY. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
 1. Thoroughly wet body including hair and face. If using a PAPR hold blower above head to keep filters dry.

2. With respirator still in place, thoroughly decontaminate body, hair, respirator face piece, and all other parts of the respirator except the blower and battery pack on a PAPR. Pay particular attention to cleaning the seal between the face and respirator facepiece and under the respirator straps.
 3. Take a deep breath, hold it and/or exhale slowly, completely wetting hair, face, and respirator. While still holding breath, remove the respirator and hold it away from the face before starting to breathe.
- C. Carefully decontaminate the facepiece of the respirator inside and out. If using a PAPR, shut down using the following sequence: a) first cap inlets to filters; b) turn blower off to keep debris collected on the inlet side of the filter from dislodging and contaminating the outside of the unit; c) thoroughly decontaminate blower and hoses; d) carefully decontaminate battery pack with a wet rag being cautious of getting water in the battery pack thus preventing destruction. **THIS PROCEDURE IS NOT A SUBSTITUTE FOR RESPIRATOR CLEANING!**
- D. Shower and wash body completely with soap and water. Rinse thoroughly.
- E. Rinse shower room walls and floor to drain prior to exiting.
- F. Proceed from shower to clean room; dry off and change into street clothes or into new disposable work clothing.

1.8.6 REGULATED AREA REQUIREMENTS

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

1.9 DECONTAMINATION FACILITIES

1.9.1 DESCRIPTION

- A. Provide each regulated area with separate personnel (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF is 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.

1.9.2 GENERAL REQUIREMENTS

All personnel entering or exiting a regulated area shall follow the requirements at 29 CFR 1926.1101 (j)(1) and these specifications. All equipment and 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. Weigh sheets with layers of duct tape so that they close quickly after release. Put arrows on sheets so they show direction of travel and overlap. If the building adjacent area is occupied, construct a solid barrier on the occupied side(s) to protect the sheeting.

1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF

The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention must be provided at the point of connection to the VA system. Water supply must be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary electric power with ground fault protection and overhead wiring in the PDF and W/EDF. Provide a sub-panel 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 to maintain 70°F throughout the PDF and W/EDF..

1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)

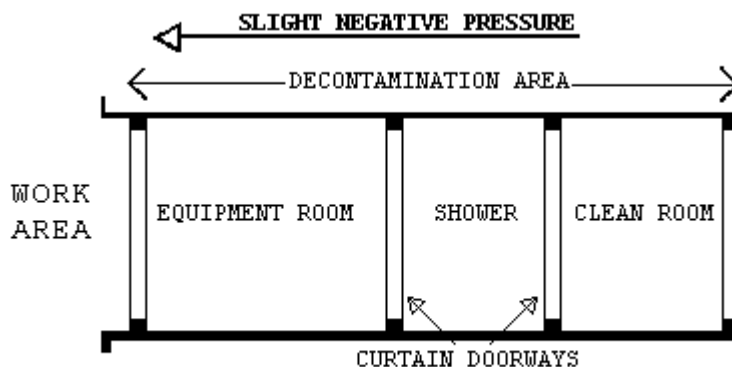
The Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room. The PDF must be sized to accommodate the number of personnel scheduled for the project. The shower room, located in the center of the PDF, shall be fitted with as many portable showers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

1. Clean Room: The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 2 layers of 6 mil fire retardant poly to provide an air tight room. Provide a minimum of 2 - 900 mm (3 foot) wide flapped doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. An adequate supply of disposable towels shall be provided. Provide storage lockers per person. A portable fire extinguisher, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and

- dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.
2. Shower Room: The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the regulated area to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using air tight walls made from at least 3 layers of 6 mil fire retardant poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Waste water will be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters will be changed a minimum of daily or more often as needed. Filter changes must be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.
 3. Equipment Room: The Competent Person shall provide an equipment room which shall be an air tight compartment for the storage of work equipment, reusable footwear and for use as a change station for personnel exiting the regulated area. The equipment room shall be separated from the regulated area by a minimum 3 foot wide door made of 2 layers of 6 mil fire retardant poly. The equipment room shall be separated from the regulated area, the shower room and the rest of the building by air tight walls and ceiling constructed of a minimum of 3 layers of 6 mil 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. Provide a temporary electrical sub-panel equipped with GFCI in this room to accommodate any equipment required in the regulated area.

4. The PDF shall consist of the following: 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 is minimum of 2 layers of 6 mil fire retardant poly.



1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)

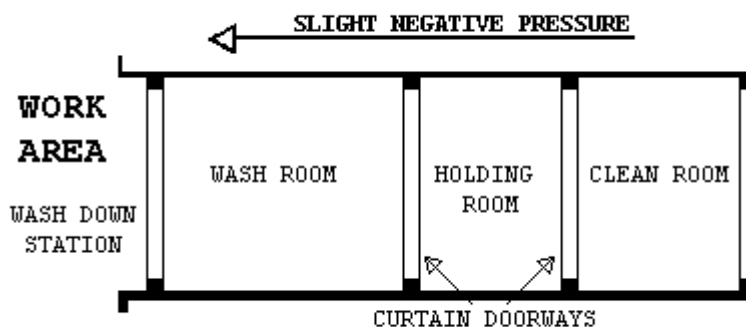
The Competent Person shall provide a W/EDF consisting of a wash room, holding room, and clean room for removal of all waste, equipment and contaminated material from the regulated area. Personnel shall not enter or exit the W/EDF except in the event of an emergency. Clean debris and residue in the W/EDF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

1. Wash Down Station: Provide an enclosed shower unit in the regulated area just outside the Wash Room as an equipment, bag and container cleaning station.
2. Wash Room: Provide a wash room for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the wash room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. Locate the wash room so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the wash room shall be constructed of 2 layers of 6 mil fire retardant poly.
3. Holding Room: Provide a holding room as a drop location for bagged materials passed from the wash room. Construct the holding room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. The holding room shall be located so that bagged

material cannot be passed from the wash room to the clean room unless it goes through the holding room. Doorways in the holding room shall be constructed of 2 layers of 6 mil fire retardant poly.

4. Clean Room: Provide a clean room to isolate the holding room from the building exterior. Construct the clean room using 2 x 4 wood framing and 2 layers of 6 mil fire retardant poly. The clean room shall be located so as to provide access to the holding room from the building exterior. Doorways to the clean room shall be constructed of two layers of 6 mil fire retardant poly.

5. The W/EDF shall be provided as follows: Wash Room leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



1.9.6 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES

- A. At washdown station in the regulated area, thoroughly wet clean contaminated equipment and/or sealed polyethylene bags and pass into Wash Room after visual inspection. When passing anything into the Wash Room, close all doorways of the W/EDF, other than the doorway between the washdown station and the Wash Room. Keep all outside personnel clear of the W/EDF. Once inside the Wash Room, wet clean the equipment and/or bags. After cleaning and inspection, pass items into the Holding Room. Close all doorways except the doorway between the Holding Room and the Clean Room. Workers from the Clean Room/Exterior shall enter the Holding Room and remove the decontaminated/cleaned equipment/bags for removal and disposal. These personnel will not be required to wear PPE. At no time shall personnel from the clean side be allowed to enter the Wash Room.

PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT**2.1 MATERIALS AND EQUIPMENT****2.1.1 GENERAL REQUIREMENTS (ALL ABATEMENT PROJECTS)**

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

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated/work area until abatement is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized place.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.
- E. Poly sheeting put under the glovebag regulated area shall be a minimum of 6 mils in thickness.
- F. If required, 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.
- G. Polyethylene sheeting utilized for personnel decontamination facility shall be opaque white or black in color, 6 mil fire retardant poly.
- H. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and waste water filtration system shall be provided by the Contractor.
- I. An adequate number of HEPA vacuums, scrapers, sprayers, nylon brushes, brooms, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements shall be provided. 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 shall also be provided. All electrically operated hand tools, equipment, electric cords shall be equipped with GFCI protection.

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

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

2.2.1 GENERAL

- A. Using critical barriers, seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All horizontal surfaces in the regulated area must be covered with 2 layers of 6 mil fire retardant poly to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated, immediately stop work and clean up the contamination at no additional cost to the Government. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section - FIRESTOPPING.

2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA

- A. Place all tools, scaffolding, materials and equipment needed for working in the regulated area prior to erecting any plastic sheeting. Remove all uncontaminated removable furniture, equipment and/or supplies from the regulated area before commencing work, or completely cover with 2 layers of 6-mil fire retardant poly sheeting and secure with duct tape. Lock out and tag out any HVAC systems in the regulated area.

2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

2.2.4 CRITICAL BARRIERS

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

2.2.5 SECONDARY BARRIERS

- A. A loose layer of 6 mil fire retardant poly shall be used as a drop cloth to protect the floor/horizontal surfaces from debris generated during the glovebag abatement. This layer shall be replaced as needed during the work.

2.2.6 EXTENSION OF THE REGULATED AREA

- A. 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. If the affected area cannot be added to the regulated area, decontamination measures must be started immediately and continue until air monitoring indicates background levels are met.

2.2.7 FIRESTOPPING

- A. Through penetrations caused by cables, cable trays, pipes, sleeves must be firestopped with a fire-rated firestop system providing an air tight seal.
- B. Firestop materials that are not equal to the wall or ceiling penetrated shall be brought to the attention of the VA Representative. The Contractor shall list all areas of penetration, the type of sealant used, and whether or not the location is fire rated. Any discovery of penetrations during abatement shall be brought to the attention of the VA Representative immediately. All walls, floors and ceilings are considered fire rated unless otherwise determined by the VA Representative or Fire Marshall.

- C. Any visible openings whether or not caused by a penetration shall be reported by the Contractor to the VA Representative for a sealant system determination. Firestops shall meet ASTM E814 and UL 1479 requirements for the opening size, penetrant, and fire rating needed.

2.3 MONITORING, INSPECTION AND TESTING

2.3.1 GENERAL

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. The CPIH shall periodically inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.
- B. The VA will employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH will perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.
- C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples

and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH with review and approval of the VPIH/CIH. An agreement between the CPIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

2.3.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT

- A. The purpose of the work of the VPIH/CIH is to: Assure quality; resolve problems; and prevent the spread of contamination beyond the regulated area. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:
 - 1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
 - 2. Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.
 - 3. Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
 - 4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of unforeseen developments, etc.
 - 5. Task 5: Perform, in the presence of the VA representative, final inspection and testing of a decontaminated regulated area or building at the conclusion of the abatement and clean-up work to certify compliance with all regulations and the VA requirements/specifications.
 - 6. Task 6: Issue certificate of decontamination for each regulated area or building and project report.
- B. All data, inspection results and testing results generated by the VPIH/CIH will be available to the Contractor for information and

consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.

- C. The monitoring and inspection results of the VPIH/CIH will be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated.

2.3.3 MONITORING, INSPECTION AND TESTING BY ABATEMENT CONTRACTOR CPIH

- A. The CPIH 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 is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor's personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor /Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in air sampling and analysis. The IH Technician shall have a NIOSH 582 Course or equivalent and show proof. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA/State Contractor/Supervisor and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT. A daily log documenting all OSHA requirements for air monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH. The log will contain, at a minimum, information on personnel or area sampled, 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 shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH

will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH responsibilities.

2.4 STANDARD OPERATING PROCEDURES

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

- A. Minimum Personnel Qualifications
- B. Contingency Plans and Arrangements
- C. Security and Safety Procedures
- D. Respiratory Protection/Personal Protective Equipment Program and Training
- E. Medical Surveillance Program and Recordkeeping
- F. Regulated Area Requirements for Glovebag Abatement
- G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
- H. Monitoring, Inspections, and Testing
- I. Removal Procedures For Piping ACM Using the Glovebag Method
- J. Disposal of ACM waste
- K. Regulated Area Decontamination/Clean-up
- L. Regulated Area Visual and Air Clearance
- M. Project Completion/Closeout

2.5 SUBMITTALS

2.5.1 PRE-CONSTRUCTION MEETING SUBMITTALS

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

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.

- C. Submit Standard Operating Procedures developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH.
- D. Submit the specifics of the materials and equipment to be used for this project with brand names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
 - 1. HEPA vacuums, air monitoring pumps, calibration devices, and emergency power generating system.
 - 2. Waste water filtration system, shower system, critical/floor barriers.
 - 3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, fire extinguishers.
 - 4. Personal protective equipment.
 - 5. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.
- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
 - 1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project:
Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
 - 2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years:
Project Name; Reason; Date; Reference Name/Number; Resolution

3. List asbestos regulatory citations, penalties, damages paid and legal actions taken against the company in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; provide references; phone numbers; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
 1. CPIH: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of SOP's developed; medical opinion; current respirator fit test.
 2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person /Supervisor; list of similar projects as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion; current respirator fit test.
 3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion; current respirator fit test.
 - J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain english the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of SOP's incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who does and how is air monitoring conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and standard operating procedures; copies of monitoring results of the five referenced projects listed and analytical method(s) used.
 - K. When rental equipment is to be used in regulated areas or used to transport asbestos waste, the contractor shall assure complete

decontamination of the rental equipment before return to the rental agency.

1. Submit, before the start of work, the manufacturer's technical data and MSDS for encapsulants used on the project. Provide application instructions also.

2.5.2 SUBMITTALS DURING ABATEMENT

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as critical barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWA's/EL's. Submit this daily log to VA's representative.
- B. The CPIH shall document and maintain the following during abatement and submit as appropriate to the VA's representative.
 1. Inspection and approval of the regulated area preparation prior to start of work and daily during work.
 2. Removal of any poly critical/floor barriers.
 3. Visual inspection/testing by the CPIH prior to application of lockdown encapsulation.
 4. Packaging and removal of ACM waste from regulated area.
 5. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the VA's representative on a weekly basis.

2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT

- A. The CPIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. The report shall include a certificate of completion, signed and dated by the CPIH, in accordance with Attachment #1. The VA Representative will forward the abatement report to the Medical Center after completion of the project.

2.6 ENCAPSULANTS

2.6.1 TYPES OF ENCAPSULANTS

- A. The following four types of encapsulants must comply with performance requirements as stated in paragraph 2.6.2:
 1. Removal encapsulant - used as a wetting agent to remove ACM.
 2. Bridging encapsulant - provides a tough, durable coating on ACM.

3. Penetrating encapsulant - penetrates/encapsulates ACM at least 13 mm (1/2").
4. Lockdown encapsulant - seals microscopic fibers on surfaces after ACM removal.

2.6.2 PERFORMANCE REQUIREMENTS

Encapsulants shall meet the latest requirements of EPA; shall not contain toxic or hazardous substances; or solvents; and shall comply with the following performance requirements:

- A. General Requirements for all Encapsulants:
 1. ASTM E84: Flame spread of 25; smoke emission of 50.
 2. University of Pittsburgh Protocol: Combustion Toxicity; zero mortality.
 3. ASTM C732: Accelerated Aging Test; Life Expectancy - 20 years.
 4. ASTM E96: Permeability - minimum of 0.4 perms.
- B. Bridging/Penetrating Encapsulants:
 1. ASTM E736: Cohesion/Adhesion Test - 24 kPa (50 lbs/ft²).
 2. ASTM E119: Fire Resistance - 3 hours (Classified by UL for use on fibrous/cementitious fireproofing).
 3. ASTM D2794: Gardner Impact Test; Impact Resistance - minimum 11.5 kg-mm (43 in/lb).
 4. ASTM D522: Mandrel Bend Test; Flexibility - no rupture or cracking.
- C. Lockdown Encapsulants:
 1. ASTM E119: Fire resistance - 3 hours (tested with fireproofing over encapsulant applied directly to steel member).
 2. ASTM E736: Bond Strength - 48 kPa (100 lbs/ft²) (test compatibility with cementitious and fibrous fireproofing).
 3. In certain situations, encapsulants may have to be applied to hot pipes/equipment. The encapsulant must be able to withstand high temperatures without cracking or off-gassing any noxious vapors during application.

2.7 CERTIFICATES OF COMPLIANCE

- A. 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.

2.8 RECYCLABLE PROTECTIVE CLOTHING

- A. If recyclable clothing is provided, all requirements of EPA, DOT and OSHA shall be met.

PART 3 - EXECUTION**3.1 PRE-ABATEMENT ACTIVITIES****3.1.1 PRE-ABATEMENT MEETING**

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

3.1.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS

Before any work begins on the construction of the regulated area, the Contractor will:

- A. 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.
- B. The VA Representative, the Contractor, and the VPIH/CIH must be aware of 10/95 A/E Quality Alert indicating the failure to identify asbestos as applicable to glovebag abatement in the areas listed. Make sure these areas are looked at/reviewed on the project: Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside chases/walls; transite piping/ductwork/sheets; behind radiators; below window sills; water/sewer lines; electrical conduit coverings; steam line trench coverings.
- C. The abatement contractor shall ensure that all furniture, machinery, equipment, curtains, drapes, blinds, and other movable objects which the Contractor is required to remove from the regulated area have been cleaned and removed or properly protected from contamination.
- D. Shut down and seal with a minimum of 2 layers of 6 mil fire retardant poly all HVAC systems serving the regulated area. The regulated area

critical barriers shall be completely isolated from any other air in the building. The VA's representative will monitor the isolation provision.

- E. Shut down and lock out in accordance with 29 CFR 1910.147 all electrical circuits which pose a potential hazard. Electrical arrangements will be tailored to the particular regulated area and the systems involved. All electrical circuits affected will be turned off at the circuit box outside the regulated area, not just the wall switch. The goal is to eliminate the potential for electrical shock which is a major threat to life in the regulated area due to water use and possible energized circuits. Electrical lines used to power equipment in the regulated area shall conform to all electrical safety standards and shall be isolated by the use of a ground fault circuit interrupter (GFCI). All GFCI shall be tested prior to use. The VA's representative will monitor the electrical shutdown.
- F. If required, remove and dispose of carpeting from floors in the regulated area.
- G. Inspect existing firestopping in the regulated area. Correct as needed.

3.1.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS

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

3.2 REGULATED AREA PREPARATIONS

3.2.1 OSHA DANGER SIGNS

Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough

away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.

3.2.2 SHUT DOWN - LOCK OUT ELECTRICAL

Shut down and lock out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.

3.2.3 SHUT DOWN - LOCK OUT HVAC

Shut down and lock out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area.

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

3.2.4 SANITARY FACILITIES

The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

3.2.5 WATER FOR ABATEMENT

The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention.

3.2.6 PRE-CLEANING MOVABLE OBJECTS

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.

3.2.7 PRE-CLEANING FIXED OBJECTS

Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention must be paid to machinery behind grills or gratings where access may be difficult but contamination may be significant. Also, pay particular attention to wall, floor and ceiling penetration behind fixed items. After precleaning, enclose fixed objects with 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 here along with specified means of protection. Contact the manufacturer for special protection requirements.

3.2.8 PRE-CLEANING SURFACES IN THE REGULATED AREA

- A. 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.

3.3 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA

3.3.1 GENERAL

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

3.3.2 PREPARATION PRIOR TO SEALING OFF

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

3.3.3 CONTROLLING ACCESS TO THE REGULATED AREA

- A. Access to the regulated area shall be permitted only through the PDF. All other means of access shall be closed off by proper sealing and DANGER signs posted on the clean side of the regulated area where it is adjacent to or within view of any occupiable area. An opaque visual barrier of 6 mil poly shall be provided so that the abatement work is not visible to any building occupants. If the area adjacent to the regulated area is accessible to the public, construct a solid barrier on the public side of the sheeting for protection and isolation of the project. The barrier shall be constructed with nominal 2" x 4" (50mm x 100mm) wood or metal studs 16" (400mm) on centers, securely anchored to

prevent movement and covered with a minimum of 1/2" (12.5mm) plywood. Provide an appropriate number of OSHA DANGER signs for each visual and physical barrier. Any alternative method must be given a written approval by the VA's representative.

3.3.4 CRITICAL BARRIERS

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

3.3.5 EXTENSION OF THE REGULATED AREA

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

3.3.6 FLOOR BARRIERS:

- A. All floors within 10' of glovebag work shall be covered with 2 layers of 6 mil fire retardant poly.

3.4 REMOVAL OF PIPING ACM

3.4.1 WETTING MATERIALS

- A. Use amended water for the wetting of ACM prior to removal. The Competent Person shall assure the wetting of ACM meets the definition of "adequately wet" in the EPA NESHAP's regulation and OSHA's "wet methods" for the duration of the project. A removal encapsulant may be used

instead of amended water with written approval of the VA's representative.

- B. Amended Water: Provide water to which a surfactant has been added shall be used to wet the ACM and reduce the potential for fiber release during disturbance of ACM. The mixture must be equal to or greater than the wetting provided by water amended by a surfactant consisting one ounce of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with 5 gallons (19L) of water.
- C. Removal Encapsulant: Provide a penetrating encapsulant designed specifically for the removal of ACM. The material must, when used, result in adequate wetting of the ACM and retard fiber release during disturbance equal to or greater than the amended water described above in B.

3.4.2 SECONDARY BARRIER AND WALKWAYS

- A. 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 floors within 10 feet (3M) of the area where work is to done. Secure the secondary barrier with duct tape to prevent 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.
- B. Install walkways using 6 mil poly between the regulated area and the decontamination facilities (PDF and W/EDF) to protect the floor from contamination and damage. Install the walkways at the beginning of each shift and remove at the end of each shift.

3.4.3 WET REMOVAL OF ACM

- A. Using acceptable glovebag procedures, adequately and thoroughly wet the ACM to be removed prior to removal to reduce/prevent fiber release to the air. Adequate time must be allowed for the amended water to saturate the ACM. Abatement personnel must not disturb dry ACM. Use a fine spray of amended water or removal encapsulant. Saturate the material sufficiently to wet to the substrate without causing excessive dripping. The material must be sprayed repeatedly/continuously during the removal process in order to maintain adequately wet conditions. Removal encapsulants must be applied in accordance with the manufacturer's written instructions. Perforate or carefully separate, using wet methods, an outer covering that is painted or jacketed in order to allow penetration and wetting of the material. Where necessary, carefully remove covering while wetting to minimize fiber release. In no event

shall dry removal occur except in the case of electrical hazards or a greater safety issue is possible!

3.5 GLOVEBAG REMOVAL PROCEDURES

3.5.1 GENERAL

All applicable OSHA requirements and glovebag manufacturer's recommendations shall be met during glove bagging operations.

1. Mix the surfactant with water in the garden sprayer, following the manufacturer's directions.
2. Have each employee put on a HEPA filtered respirator approved for asbestos and check the fit using the positive/negative fit check.
3. Have each employee put on a disposable full-body suit. Remember, the hood goes over the respirator straps.
4. Check closely the integrity of the glove bag to be used. Check all seams, gloves, sleeves, and glove openings. OSHA requires the bottom of the bag to be seamless.
5. Check the pipe where the work will be performed. If it is damaged (broken lagging, hanging, etc.), wrap the entire length of the pipe in poly sheeting and "candy stripe" it with duct tape.
6. Attach glovebag with required tools per manufacturer's instructions.
7. Using the smoke tube and aspirator bulb, test 10% of glovebags by placing the tube into the water porthole (two-inch opening to glove bag), and fill the bag with smoke and squeeze it. If leaks are found, they should be taped closed using duct tape and the bag should be retested with smoke.
8. Insert the wand from the water sprayer through the water porthole.
9. Insert the hose end from a HEPA vacuum into the upper portion of the glove bag.
10. Wet and remove the pipe insulation.
11. If the section of pipe is covered with an aluminum jacket, remove it first using the wirecutters to cut any bands and the tin snips to remove the aluminum. It is important to fold the sharp edges in to prevent cutting the bag when placing it in the bottom.
12. When the work is complete, spray the upper portion of the bag and clean-push all residue into the bottom of the bag with the other waste material. Be very thorough. Use adequate water.
13. Put all tools, after washing them off in the bag, in one of the sleeves of glove bag and turn it inside out, drawing it outside of the bag. Twist the sleeve tightly several times to seal it and tape it several tight turns with duct tape. Cut through the middle of the duct tape and remove the sleeve. Put the sleeve in the next glove bag

or put it in a bucket of water to decontaminate the tools after cutting the sleeve open.

14. Turn on the HEPA vacuum and collapse the bag completely. Remove the vacuum nozzle, seal the hole with duct tape, twist the bag tightly several times in the middle, and tape it to keep the material in the bottom during removal of the glove bag from the pipe.
15. Slip a disposal bag over the glove bag (still attached to the pipe). Remove the tape securing the ends, and slit open the top of the glove bag and carefully fold it down into the disposal bag. Double bag and gooseneck waste materials.

3.5.2 NEGATIVE PRESSURE GLOVEBAG PROCEDURE

1. In addition to the above requirements, the HEPA vacuum shall be run continuously during the glovebag procedure until completion at which time the glovebag will be collapsed by the HEPA vacuum prior to removal from the pipe/component.
2. The HEPA vacuum shall be attached and operated as needed to prevent collapse of the glovebag during the removal process.

3.6 LOCKDOWN ENCAPSULATION

3.6.1 GENERAL

- A. Lockdown encapsulation is an integral part of the ACM removal. At the conclusion of ACM removal and before removal of the primary barriers, all piping surfaces shall be encapsulated with a bridging encapsulant.

3.6.2 SEALING EXPOSED EDGES

- A. Seal edges of ACM exposed by removal work with two coats of encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the encapsulant.

3.7 DISPOSAL OF ACM WASTE MATERIALS

3.7.1 GENERAL

- A. Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA and DOT. The landfill requirements for packaging must also be met. Disposal shall be done at the approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

3.7.2 PROCEDURES

- A. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification. Waste shall be double-bagged prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall securely sealed to prevent accidental opening and/or leakage. The top shall be tightly twisted and goosenecked prior to tightly sealing with

at least three wraps of duct tape. Ensure that unauthorized persons do not have access to the waste material once it is outside the regulated area. All transport containers must be covered at all times when not in use. NESHAP's signs must be on containers during loading and unloading. Material shall not be transported in open vehicles. If drums are used for packaging, the drums shall be labeled properly and shall not be re-used.

- B. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second bag. C. Asbestos waste with sharp edged components, i.e., nails, screws, lath, strapping, tin sheeting, jacketing, metal mesh, etc., which might tear poly bags shall be wrapped securely in burlap before packaging and, if needed, use a poly lined fiber drum as the second container, prior to disposal.

3.8 PROJECT DECONTAMINATION

3.8.1 GENERAL

- A. The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH.
- B. If the asbestos abatement work is in an area which was contaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal and cleaning of the regulated area surfaces after the primary barrier removal.
- C. If the asbestos abatement work is in an area which was uncontaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal, thus preventing contamination of the building when the regulated area critical barriers are removed.

3.8.2 REGULATED AREA CLEARANCE

- A. Air testing and other requirements which must be met before release of the Contractor and re-occupancy of the regulated area space are specified in Final Testing Procedures.

3.8.3 WORK DESCRIPTION

- A. Decontamination includes the cleaning and clearance of the air in the regulated area and the decontamination and removal of the enclosures/facilities installed prior to the abatement work including primary/critical barriers, PDF and W/EDF facilities.

3.8.4 PRE-DECONTAMINATION CONDITIONS

- A. Before decontamination starts, all ACM waste from the regulated area shall be removed, all waste collected and removed, and the secondary

barrier of poly removed and disposed of along with any gross debris generated by the work.

- B. At the start of decontamination, the following shall be in place:
 - 1. Critical barriers over all openings consisting of two layers of 6 mil poly which is the sole barrier between the regulated area and the rest of the building or outside.
 - 2. Decontamination facilities, if required for personnel and equipment in operating condition.

3.8.5 FIRST CLEANING

- A. Carry out a first cleaning of all surfaces of the regulated area including items of remaining poly sheeting, tools, scaffolding, ladders/staging by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping methods. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible residue from abated surfaces or poly or other surfaces. If determined by the CPIH/VPIH/CIH additional cleaning(s) may be needed.

3.8.6 PRE-CLEARANCE INSPECTION AND TESTING

- A. The CPIH and VPIH/CIH will perform a thorough and detailed visual inspection after the first cleaning to determine whether there is any visible residue in the regulated area. If the visual inspection is acceptable, the CPIH will perform pre-clearance sampling using aggressive clearance as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A(III)(B)(7)(d). If the sampling results show values below 0.01 f/cc, then the Contractor shall notify the VA's representative of the results with a brief report from the CPIH documenting the inspection and sampling results and a statement verifying that the regulated area is ready for lockdown encapsulation. The VA reserves the right to utilize their own VPIH/CIH to perform a pre-clearance inspection and testing for verification.

3.8.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES

- A. 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.

3.9 FINAL VISUAL INSPECTIONS AND AIR CLEARANCE TESTING

3.9.1 GENERAL

- A. Notify the VA representative 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing will be performed by the VPIH/CIH after the final cleaning.

3.9.2 FINAL VISUAL INSPECTION

- A. Final visual inspection will include the entire regulated area, the PDF, all poly sheeting, seals over HVAC openings, doorways, windows, and any other openings. If any debris, residue, dust or any other suspect material is detected, the final cleaning shall be repeated at no cost to the VA. Dust/material samples may be collected and analyzed at no cost to the VA at the discretion of the VPIH/CIH to confirm visual findings. When the regulated area is visually clean the final testing can be done.

3.9.3 FINAL AIR CLEARANCE TESTING

- A. After an acceptable final visual inspection by the VPIH/CIH and VA Representative, the VPIH/CIH will perform the final testing. Air samples will be collected and analyzed in accordance with procedures for PCM/TEM in this specification. If the release criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures. Additional inspection and testing will be done at the expense of the Contractor.
- B. If the results of the PCM/TEM are acceptable, remove the critical barriers. Any small quantities of residue material found upon removal of the poly shall be removed with a HEPA vacuum and localized isolation. If significant quantities are found as determined by the VPIH/CIH, then the entire area affected shall be cleaned as specified in the final cleaning.
- C. When release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

3.9.4 FINAL AIR CLEARANCE PROCEDURES

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc as measured with PCM/TEM methods.
- B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the VPIH/CIH will secure samples and analyze them according to the following procedures:
1. Fibers Counted: "Fibers" referred to in this section shall be either all fibers regardless of composition as counted in the NIOSH 7400 PCM method or asbestos fibers counted using the TEM method.
 2. Aggressive Sampling: All final air testing samples shall be collected using aggressive sampling techniques. Samples will be collected on 0.8µ MCE filters for PCM analysis and 0.45µ Polycarbonate filters for TEM analysis. Before pumps are started, initiate aggressive sampling

as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). Air samples will be collected in areas subject to normal air circulation away from corners, obstructed locations, and locations near windows, doors, or vents. After air sampling pumps have been shut off, circulating fans shall be shut off.

3.9.5 CLEARANCE SAMPLING USING PCM

The NIOSH 7400 method will be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 5 PCM clearance samples will be collected.

3.9.6 CLEARANCE SAMPLING USING TEM

TEM clearance requires a minimum of 13 samples taken and analyzed, including five samples in the regulated area, five samples outside the regulated area and three field blanks using polycarbonate filters.

3.9.7 LABORATORY TESTING OF PCM SAMPLES

The services of an AIHA accredited laboratory will be employed by the VA to perform analysis of the air samples. Samples will be sent by the VPIH/CIH so that verbal/faxed reports can be received within 24 hours. A complete record, certified by the laboratory, of all air monitoring tests and results will be furnished to the VA's representative and the Contractor.

3.9.8 LABORATORY TESTING OF TEM SAMPLES

Samples shall be sent by the VPIH/CIH to an accredited laboratory for analysis by TEM. Verbal/faxed results from the laboratory shall be available within 24 hours after receipt of the samples. A complete record, certified by the laboratory, of all TEM results shall be furnished to the VA's representative and the Contractor.

3.10 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.10.1 COMPLETION OF ABATEMENT WORK

After thorough decontamination, complete asbestos abatement work upon meeting the regulated area clearance criteria and fulfilling the following:

- A. Remove all equipment, materials, and debris from the project area.
- B. Package and dispose of all asbestos waste as required.
- C. Repair or replace all interior finishes damaged during the abatement work.
- D. Fulfill other project closeout requirements as specified elsewhere in this specification.

3.10.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

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

3.10.3 WORK SHIFTS

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

3.10.4 RE-INSULATION

If required as part of the contract, replace all asbestos containing insulation with suitable non-asbestos material. Provide MSDS's for all replacement materials. Refer to Section 23 07 11, HVAC AND PLUMBING INSULATION.

ATTACHMENT #1

CERTIFICATE OF COMPLETION

DATE:

PROJECT NAME:

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 glovebag work was done in accordance with OSHA requirements and the manufacturer's recommendations.

CPIH Name:

Signature/Date:

Asbestos Abatement Contractor's Name:

Signature/Date:

ATTACHMENT #2

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

DATE:

PROJECT NAME:

PROJECT ADDRESS:

ABATEMENT CONTRACTOR'S NAME:

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

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

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

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

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

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

Signature:

Social Security Number:

Printed Name:

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:

Date:

Printed Name of CPIH:

Signature of Contractor:

Date:

Printed Name of Contractor:

VA Project Location:

VA Project #:

VA Project Description:

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

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

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

Abatement Contractor Owner's Signature _____ Date _____

Abatement Contractor Competent Person(s)	Date
--	------

Date _____

Date _____

- - - E N D - - -

SECTION 02 82 13.19
ASBESTOS FLOOR TILE AND MASTIC ABATEMENT

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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 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 Asbestos Abatement Contractor (Contractor) discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the Contracting Officer for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor without obtaining guidance from the Contracting Officer shall become the sole risk and responsibility of the Contractor. All cost incurred due to such action are also the responsibility of the Contractor.

1.2 EXTENT OF WORK

- A. Below is a brief description of the estimated quantities of asbestos flooring materials to be abated. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Contractor shall satisfy himself as the actual quantities to be abated. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents.
- B. Removal, clean-up and disposal of ACM flooring in an appropriate regulated area in the following approximate quantities;
15,500 square feet of floor tiles, mastic, carpet glue, stair covers, floor sheeting

1.3 RELATED WORK

- A. Section 07 84 00, FIRESTOPPING.
B. Section 02 41 00, DEMOLITION.
C. Division 09; FINISHES.

1.4 TASKS

The work tasks are summarized briefly as follows:

- A. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, work-site

preparations, emergency procedures arrangements, and standard operating procedures for Class II asbestos abatement work.

- B. Abatement activities including removal, 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.

1.5 ABATEMENT CONTRACTOR USE OF PREMISES

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

1.6 VARIATIONS IN QUANTITY

- A. The quantities and locations of ACM as indicated on the drawings and the extent of work included in this section are estimates which are limited by the physical constraints imposed by occupancy of the buildings. Accordingly, minor variations (+/- 5%) in quantities of ACM within the regulated area are considered as having no impact on contract price and time requirements of this contract. Where additional work is required beyond the above variation, the Contractor shall provide unit prices for additional work that is newly discovered materials and those prices will be used for additional work under the contract.

1.7 STOP ASBESTOS REMOVAL

If the Contracting Officer or their field representative presents a written **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the VA. A stop asbestos removal order may be

issued at any time the VA determines abatement conditions/ activities are not within specification requirements. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the industrial hygienist's time. The occurrence of any of the following events shall be reported immediately by the Contractor in writing to the VA representative and shall require the Contractor to immediately stop asbestos removal activities and initiate fiber reduction activities:

- A. \geq 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area;
- B. breach/break in regulated area critical barrier(s)/floor;
- C. serious injury/death at the site;
- D. fire/safety emergency at the site;
- E. respiratory protection system failure;
- F. power failure loss of wetting agent; or
- G. any visible emissions observed outside the regulated area.

1.8 GENERAL

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

1.9 GLOSSARY

Abatement - Procedures to control fiber release from asbestos-containing materials, typically during removal. Includes removal, encapsulation, enclosure, demolition and renovation activities related to asbestos.

ACE - Asbestos contaminated elements.

ACM - Asbestos containing material.

Aerosol - Solid or liquid particulate suspended in air.

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

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

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

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

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

Air monitoring - The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air.

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

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

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

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

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

Asbestos-containing waste material - Asbestos-containing material or asbestos contaminated objects requiring disposal.

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

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

Authorized visitor - Any person approved by the VA; the contractor; or any government agency having jurisdiction over the regulated area.

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

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

Critical Barrier - The barrier responsible for isolating the regulated area from adjacent spaces, typically constructed of plastic sheeting

secured in place at openings such as doors, windows, or any other opening into the regulated area.

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

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

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

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

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

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

Certified Industrial Hygienist (CIH) - One certified in practice of industrial hygiene by the American Board of Industrial Hygiene. An industrial hygienist Certified in Comprehensive Practice by the American Board of Industrial Hygiene.

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

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

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

Clearance sample - The final air sample taken after all asbestos work has been done and visually inspected.

Performed by the VA's industrial hygiene consultant (VPIH).

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

Competent person - In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to

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

Contractor's Professional Industrial Hygienist (CPIH) - The Contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of the PIH.

Count - Refers to the fiber count or the average number of fibers greater than five microns in length per cubic centimeter of air.

Decontamination area/unit - An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

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

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

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

Drum - A rigid, impermeable container made of cardboard fiber, plastic, or metal which can be sealed in order to be siftproof, dustproof, and leaktight.

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

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

Encapsulation - Treating ACM with an encapsulant.

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

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

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

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

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

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

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

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

High efficiency particulate air (HEPA) filter - A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 microns or greater in diameter.

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

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

HVAC - Heating, Ventilation and Air Conditioning

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

Industrial hygienist technician - A person working under the direction of an IH or CIH who has special training, experience, certifications and licenses required for the industrial hygiene work assigned.

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

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

National Emission Standards for Hazardous Air Pollutants (NESHAP's) - EPA's rule to control emissions of asbestos to the environment.

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

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

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

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

Organic vapor cartridge - The type of cartridge used on air purifying respirators for organic vapor exposures.

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

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

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

Personal sampling/monitoring - Representative air samples obtained in the breathing zone of the person using a cassette and battery operated pump to determine asbestos exposure.

Permissible exposure limit (PEL) - The level of exposure OSHA allows for an 8 hour time weighted average. For asbestos fibers, the PEL is 0.1 fibers per cc.

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

Polyethylene sheeting - Strong plastic barrier material 4 to 6 mils thick, semi-transparent, sometimes flame retardant in compliance with NFPA 241.

Positive/negative fit check - A method of verifying the fit of a respirator by closing off the filters and breathing in or closing off the exhalation valve and breathing out while detecting leakage of the respirator.

Presumed ACM (PACM) - Thermal system insulation, surfacing, and flooring material installed in buildings prior to 1981. If the building owner has actual knowledge, or should have known through the exercise of due diligence that other materials are ACM, they too must be treated as PACM. The designation of PACM may be rebutted pursuant to 29 CFR 1926.1101 (k)(5).

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

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

Protection factor - A value assigned by OSHA/NIOSH to indicate the assigned protection a respirator should provide if worn properly. The number indicates the reduction of exposure level from outside to inside the respirator.

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

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

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

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

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

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

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

Shower room - The portion of the PDF where personnel shower before leaving the regulated area. Also used for bag/drum decontamination in the EDF.

Standard operating procedures (SOP's) - Asbestos work procedures required to be submitted by the contractor before work begins.

Supplied air respirator (SAR) - A respirator that utilizes an air supply separate from the air in the regulated area.

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

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

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

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

VA Industrial Hygienist (VPIH/CIH) - Department of Veterans Affairs Professional Industrial Hygienist.

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

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

Waste/Equipment decontamination area (W/EDA) - The area in which waste is packaged and equipment is decontaminated before removal from the regulated area.

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

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

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

1.10 REFERENCED STANDARDS ORGANIZATIONS

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

- A. VA Department of Veterans Affairs
810 Vermont Avenue, NW
Washington, DC 20420
- B. AIHA American Industrial Hygiene Association
2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031
703-849-8888
- C. ANSI American National Standards Institute
1430 Broadway
New York, NY 10018
212-354-3300
- D. ASTM American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103
215-299-5400
- E. CFR Code of Federal Regulations
Government Printing Office
Washington, DC 20420
- F. CGA Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, VA 22202
703-979-0900
- G. CS Commercial Standard of the National Institute of Standards and Technology (NIST)
U. S. Department of Commerce
Government Printing Office
Washington, DC 20420
- H. EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460
202-382-3949
- I. MIL-STD Military Standards/Standardization Division
Office of the Assistant Secretary of Defense
Washington, DC 20420

- J. MSHA Mine Safety and Health Administration
Respiratory Protection Division
Ballston Tower #3
Department of Labor
Arlington, VA 22203
703-235-1452
- K. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000
- L. NEC National Electrical Code (by NFPA)
- M. NEMA National Electrical Manufacturer's Association
2101 L Street, NW
Washington, DC 20037
- N. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555
- O. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236
- P. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402
- Q. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800
- R. USA United States Army
Army Chemical Corps
Department of Defense
Washington, DC 20420

1.11 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS

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

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

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

1.12 CONTRACTOR RESPONSIBILITY

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

1.13 FEDERAL REQUIREMENTS

Federal requirements which govern some aspect of asbestos abatement include, but are not limited to, the following regulations.

- A. Occupational Safety and Health Administration (OSHA)
 - 1. Title 29 CFR 1926.1101 - Construction Standard for Asbestos
 - 2. Title 29 CFR 1910.132 - Personal Protective Equipment
 - 3. Title 29 CFR 1910.134 - Respiratory Protection
 - 4. Title 29 CFR 1926 - Construction Industry Standards
 - 5. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
 - 6. Title 29 CFR 1910.1200 - Hazard Communication
 - 7. Title 29 CFR 1910.151 - Medical and First Aid
- B. Environmental Protection Agency (EPA)
 - 1. 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
 - 2. 40 CFR 763.80 - Asbestos Hazard Emergency Response Act (AHERA)

- C. Department of Transportation (DOT)
- Title 49 CFR 100 - 185 - Transportation

1.14 STATE REQUIREMENTS

State requirements that apply to the asbestos abatement work, disposal, clearance, etc., include, but are not limited to, the following:

- A. Illinois Department of Public Health (IDPH)

- 1. 105 ILCS 105: Illinois Asbestos Abatement Act
- 2. 77 Ill. Adm. Code 855: Asbestos Abatement for Public and Private Schools and Commercial and Private Buildings in Illinois

1.15 LOCAL REQUIREMENTS

If the county or local requirements are more stringent than federal or state standards, the local standards are to be followed.

1.16 STANDARDS

- A. Standards which govern asbestos abatement activities include, but are not limited to, the following:
 - 1. American National Standards Institute (ANSI) Z9.2-79 - Fundamentals Governing the Design and Operation of Local Exhaust Systems Z88.2 - Practices for Respiratory Protection.
 - 2. Underwriters Laboratories (UL) 586-90 - UL Standard for Safety of HEPA filter Units, 7th Edition.
- B. Standards which govern encapsulation work include, but are not limited to, the following:
 - 1. American Society for Testing and Materials (ASTM)
- C. Standards which govern the fire and safety concerns in abatement work include, but are not limited to, the following:
 - 1. National Fire Protection Association (NFPA) 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
 - 2. NFPA 701 - Standard Methods for Fire Tests for Flame Resistant Textiles and Film.
 - 3. NFPA 101 - Life Safety Code
- D. Resilient Floor Covering Institute (RFCI):
 - Recommended work practices for Removal of Resilient Floor Coverings.

1.17 EPA GUIDANCE DOCUMENTS

- A. EPA guidance documents which discuss asbestos abatement work activities are listed below. These documents are made part of this section by reference. EPA publications can be ordered from (800) 424-9065.
- B. Guidance for Controlling ACM in Buildings (Purple Book) EPA 560/5-85-024
- C. Asbestos Waste Management Guidance EPA 530-SW-85-007

- D. A Guide to Respiratory Protection for the Asbestos Abatement Industry
EPA-560-OPTS-86-001
- E. Guide to Managing Asbestos in Place (Green Book) TS 799 20T July 1990

1.18 NOTICES

- A. State and Local agencies: Send written notification as required by state and local regulations including the local fire department prior to beginning any work on ACM as follows:
- B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification is given to EPA, State, and Local authorities.

1.19 PERMITS/LICENSES

- A. The contractor shall apply for and have all required permits and licenses to perform asbestos abatement work as required by Federal, State, and Local regulations.

1.20 POSTING AND FILING OF REGULATIONS

- A. Maintain two (2) copies of applicable federal, state, and local regulations. Post one copy of each at the regulated area where workers will have daily access to the regulations and keep another copy in the Contractor's office.

1.21 VA RESPONSIBILITIES

Prior to commencement of work:

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

1.22 SITE SECURITY

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior

to commencing the project and be posted in the clean room of the decontamination unit.

- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent person shall immediately notify the VA.
- 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 of a critical barrier doorway. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside, however, they shall be sealed with poly sheeting and taped until needed.
- 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 security guards.

1.23 EMERGENCY ACTION PLAN AND ARRANGEMENTS

- A. An Emergency Action Plan shall be developed by the Contractor prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a);(b).
- B. Emergency procedures shall be in written form and prominently posted and available in the regulated area. 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 and layout of regulated area, particularly barriers that may affect response capabilities.

- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
 - 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
 - 2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.
- F. Telephone numbers of 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 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; and power failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that work is stopped and wetting is continued until correction of the problem.

1.24 PRE-START MEETING

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

- A. Proof of Contractor licensing.

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

1.25 PROJECT COORDINATION

- A. The following are the minimum administrative and supervisory personnel necessary for coordination of the work.

1.26 PERSONNEL

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

accreditation card with picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.

C. Minimum qualifications for Contractor and assigned personnel are:

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

1.27 GENERAL - RESPIRATORY PROTECTION PROGRAM

- A. The Contractor shall develop and implement a Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.132;134. ANSI Standard Z88.2-1992 provides excellent guidance for developing a respiratory protection program. All respirators used must be NIOSH approved for asbestos abatement activities. The written respiratory protection shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1)(i - ix) - Respiratory Protection Program.

1.28 RESPIRATORY PROTECTION PROGRAM COORDINATOR

- A. The Respiratory Protection Program Coordinator (RPPC) must be identified and shall have two (2) years experience coordinating the program. The RPPC must provide a signed statement attesting to the fact that the program meets the above requirements.

1.29 SELECTION AND USE OF RESPIRATORS

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

1.30 MINIMUM RESPIRATORY PROTECTION

- A. Minimum respiratory protection shall be a half face, HEPA filtered, air purifying respirator when fiber levels are maintained consistently at or below 0.1 f/cc. A higher level of respiratory protection may be provided or required, depending on fiber levels. Respirator selection shall meet the requirements of 29 CFR 1926.1101 (h); Table 1, except as indicated in this paragraph. Abatement personnel must have a respirator for their exclusive use.

1.31 MEDICAL WRITTEN OPINION

- A. No employee shall be allowed to wear a respirator unless a physician has determined they are capable of doing so and has issued a current written opinion for that person.

1.32 RESPIRATOR FIT TEST

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

1.33 RESPIRATOR FIT CHECK

- A. The Competent Person shall assure that the positive/negative fit check is done each time the respirator is donned by an employee. Headcoverings must cover respirator headstraps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a fit check shall preclude that person from wearing a respirator until resolution of the problem.

1.34 MAINTENANCE AND CARE OF RESPIRATORS

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

1.35 TRAINING OF ABATEMENT PERSONNEL

Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site.

1.36 MEDICAL EXAMINATIONS

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

1.37 PERSONAL PROTECTIVE EQUIPMENT

Provide whole body clothing, head coverings, foot coverings and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle.

1.38 REGULATED AREA ENTRY PROCEDURE

Worker protection shall meet the most stringent requirements. The Competent Person shall ensure that each time workers enter the regulated area, they remove ALL street clothes in the clean room of the

decontamination unit and put on new disposable coveralls, head coverings, a clean respirator, and then proceed through the shower room to the equipment room where they put on non-disposable required personal protective equipment.

1.39 DECONTAMINATION PROCEDURE

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

- A. When exiting the regulated area, remove all disposable PPE and dispose of in a disposal bag provided in the regulated area.
- B. Carefully decontaminate and clean the respirator. Put in a clean container/bag.

1.40 REGULATED AREA REQUIREMENTS

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

1.41 DESCRIPTION:

- A. Provide each regulated area with a fiber drum with a disposal bag in it for personnel waste materials.

1.42 WASTE/EQUIPMENT DECONTAMINATION AREA (W/EDA):

- A. The Competent Person shall provide a W/EDA for removal of all waste, equipment and contaminated material from the regulated area.

1.43 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES:

- A. Contain all waste in 6 mil poly bags. Clean/decontaminate bags and pass through a double 6 mil flap doorway into another bag or fiber drum. Remove to disposal dumpster/gondola/vehicle. At no time shall unprotected personnel from the clean side be allowed to enter the regulated area.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS (ALL ABATEMENT PROJECTS)

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

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated/work area until abatement is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized place.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.
- E. Poly sheeting for critical barriers/floors in the regulated area shall be 6 mil.
- F. If required, 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.
- G. An adequate number of infra-red heating units, 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 shall be provided. 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 shall also be provided. All electrically operated hand tools, equipment, electric cords shall be equipped with GFCI protection.
- H. 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.)
- I. Impermeable fiberboard drums and disposal bags 2 layers of 6 mil, for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
- J. The VA shall be provided a copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication. Chlorinated compounds shall not be used with any spray adhesive or other product. Appropriate encapsulant(s) shall be provided.

- K. 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.
- L. 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 hazard assessment conducted under 29 CFR 1910.132(d).

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

- A. Using critical barriers, seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All horizontal surfaces, as required, in the regulated area must be covered with 2 layers of 6 mil fire retardant poly to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated, immediately stop work and clean up the contamination at no additional cost to the Government. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section 2.2.8; Section 07 92 00, FIRESTOPPING. 2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA
- B. Place all tools, scaffolding, materials and equipment needed for working in the regulated area prior to erecting any plastic sheeting. Remove all uncontaminated removable furniture, equipment and/or supplies from the regulated area before commencing work, or completely cover with two layers of 6-mil fire retardant poly sheeting and secure with duct tape. Lock out and tag out any HVAC systems in the regulated area.

2.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

2.4 CRITICAL BARRIERS

- A. Completely separate any openings into the regulated area from adjacent areas using fire retardant poly at least 6 mils thick and duct tape. Individually seal with two layers of 6 mil poly and duct tape all HVAC openings into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other

objects in the regulated area. Heat must be shut off any objects covered with poly.

2.5 SECONDARY BARRIERS:

- A. A loose layer of 6 mil fire retardant poly shall be used as a drop cloth to protect the floor/horizontal surfaces from debris generated during the Class II work, except for floor tile abatement. This layer shall be replaced as needed during the work.

2.6 EXTENSION OF THE REGULATED AREA

- A. 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. If the affected area cannot be added to the regulated area, decontamination measures must be started immediately and continue until air monitoring indicates background levels are met.

2.7 FIRESTOPPING:

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

2.8 MONITORING, INSPECTION AND TESTING

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. The CPIH shall periodically inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and

testing requirements are also indicated in other parts of this specification.

- B. The VA will employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH will perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.
- C. If fibers counted by the VPIH/CIH during abatement work inside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed 0.05 f/cc, the Contractor shall stop work. If fiber levels exceed 0.01 f/cc outside the regulated area, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH with review and approval of the VPIH/CIH. An agreement between the CPIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

2.9 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT

- A. The purpose of the work of the VPIH/CIH is to: assure quality; resolve problems; and prevent the spread of contamination beyond the regulated area. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been

adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:

1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
 2. Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.
 3. Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
 4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of unforeseen developments, etc.
 5. Task 5: Perform, in the presence of the VA representative, final inspection and testing of a decontaminated regulated area or building at the conclusion of the abatement and clean-up work to certify compliance with all regulations and the VA requirements/specifications.
 6. Task 6: Issue certificate of decontamination for each regulated area or building and project report.
- B. All documentation, inspection results and testing results generated by the VPIH/CIH will be available to the Contractor for information and consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.
- C. The monitoring and inspection results of the VPIH/CIH will be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated.
- D. All air sampling and analysis data will be recorded on VA Form 10-0018.

2.10 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH

- A. The CPIH 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 is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor's personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the

regulated area is the exclusive responsibility of the Contractor /Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in air sampling and analysis. The IH Technician shall have a NIOSH 582 Course or equivalent and show proof. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA/State Contractor/Supervisor and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation. The analytic laboratory used by the Abatement Contractor to analyze the samples shall be AIHA accredited for asbestos PAT. A daily log documenting all OSHA requirements for air monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH. The log will contain, at a minimum, information on personnel or area sampled, 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 shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH responsibilities.

2.11 STANDARD OPERATING PROCEDURES

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

- A. Minimum Personnel Qualifications
- B. Contingency Plans and Arrangements
- C. Security and Safety Procedures

- D. Respiratory Protection/Personal Protective Equipment Program and Training
- E. Medical Surveillance Program and Recordkeeping
- F. Regulated Area Requirements for Class II work
- G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
- H. Monitoring, Inspections, and Testing
- I. Removal Procedures for Class II Materials
- J. Disposal of ACM Waste
- K. Regulated Area Decontamination/Clean-up
- L. Regulated Area Visual and Air Clearance
- M. Project Completion/Closeout

2.12 PRE-START MEETING SUBMITTALS

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

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Standard Operating Procedures developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH.
- D. Submit the specifics of the materials and equipment to be used for this project with brand names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
 - 1. HEPA vacuums, air monitoring pumps, calibration devices, infrared heating machines, and emergency power generating system.
 - 2. Encapsulants, surfactants, hand held sprayers, airless sprayers, fire extinguishers.
 - 3. Personal protective equipment.
 - 4. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of

subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.

- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
 - 1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project:
Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
 - 2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years:
Project Name; Reason; Date; Reference Name/Number; Resolution
 - 3. List asbestos regulatory citations, penalties, damages paid and legal actions taken against the company in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; provide references; phone numbers; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
 - 1. CPIH: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of SOP's developed; medical opinion; current respirator fit test.
 - 2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects as Competent

- Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion; current respirator fit test.
3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion; current respirator fit test.
- J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain english the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of SOP's incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who does and how is air monitoring conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and standard operating procedures; copies of monitoring results of the five referenced projects listed and analytical method(s) used.
- K. When rental equipment is to be used in regulated areas or used to transport asbestos waste, the contractor shall assure complete decontamination of the rental equipment before return to the rental agency.

2.13 SUBMITTALS DURING ABATEMENT

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as critical barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWA's/EL's. Submit this daily log to VA's representative.
- B. The CPIH shall document and maintain the following during abatement and submit as appropriate to the VA's representative.
1. Inspection and approval of the regulated area preparation prior to start of work and daily during work.
 2. Removal of any poly critical/floor barriers.
 3. Visual inspection/testing by the CPIH.
 4. Packaging and removal of ACM waste from regulated area.

5. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the VA's representative on a weekly basis.

2.14 SUBMITTALS AT COMPLETION OF ABATEMENT

- A. The CPIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. The report shall include a certificate of completion, signed and dated by the CPIH, in accordance with Attachment #1. The VA Representative will forward the abatement report to the Medical Center after completion of the project.

PART 3 - EXECUTION

3.1 PRE-ABATEMENT MEETING

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

3.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS

Before any work begins on the construction of the regulated area, the Contractor will:

- A. 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.
- B. The VA Representative, the Contractor, and the VPIH/CIH must be aware of 10/95 A/E Quality Alert indicating the failure to identify asbestos as applicable to glovebag abatement in the areas listed. Make sure these areas are looked at/reviewed on the project:

Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside chases/walls; transite piping/ductwork/sheets; behind radiators; below window sills; water/sewer lines; electrical conduit coverings; steam line trench coverings.

- C. Abatement contractor shall ensure that all furniture, machinery, equipment, curtains, drapes, blinds, and other movable objects which the Contractor is required to remove from the regulated area have been cleaned and removed or properly protected from contamination.
- D. Shut down and seal with a minimum of 2 layers of 6 mil fire retardant poly all HVAC systems and critical openings in the regulated area. The regulated area critical barriers shall be completely isolate the regulated area from any other air in the building. The VA's representative will monitor the isolation provision.
- E. Shut down and lock out in accordance with 29 CFR 1910.147 all electrical circuits which pose a potential hazard. Electrical arrangements will be tailored to the particular regulated area and the systems involved. All electrical circuits affected will be turned off at the circuit box outside the regulated area, not just the wall switch. The goal is to eliminate the potential for electrical shock which is a major threat to life in the regulated area due to water use and possible energized circuits. Electrical lines used to power equipment in the regulated area shall conform to all electrical safety standards and shall be isolated by the use of a ground fault circuit interrupter (GFCI). All GFCI shall be tested prior to use. The VA's representative will monitor the electrical shutdown.
- F. If required, remove and dispose of carpeting from floors in the regulated area.
- G. Inspect existing firestopping in the regulated area. Correct as needed.

3.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS

- A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
- B. Upon completion of all preparatory work, the CPIH will inspect the work and systems and will notify the VA's representative when the work is completed in accordance with this specification. The VA's representative may inspect the regulated area and the systems with the VPIH/CIH and may require that upon satisfactory inspection, Contractor's employees perform all major aspects of the approved SOP's, especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation.

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

3.4 OSHA DANGER SIGNS

- A. Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.

3.5 SHUT DOWN - LOCK OUT ELECTRICAL

- A. Shut down and lock out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.

3.6 SHUT DOWN - LOCK OUT HVAC

- A. Shut down and lock out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6 mil poly disposal bags for disposal as asbestos waste.

3.7 SANITARY FACILITIES

- A. The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

3.8 WATER FOR ABATEMENT

- A. The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention.

3.9 PRE-CLEANING MOVABLE OBJECTS

- A. 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.

3.10 PRE-CLEANING FIXED OBJECTS

- A. Abatement contractor shall Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention must be paid to machinery behind grills or gratings where access may be difficult but contamination may be significant. Also, pay particular attention to wall, floor and ceiling penetration behind fixed items. After precleaning, enclose fixed objects with 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 here along with specified means of protection. Contact the manufacturer for special protection requirements.

3.11 PRE-CLEANING SURFACES IN THE REGULATED AREA

- A. 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.

3.12 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA

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

3.13 PREPARATION PRIOR TO SEALING OFF

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

3.14 CONTROLLING ACCESS TO THE REGULATED AREA

- A. Access to the regulated area shall be permitted only by the competent person. All other means of access shall be closed off by proper sealing and OSHA DANGER demarcation signs posted on the clean side of the regulated area where it is adjacent to or within view of any occupiable area. An opaque visual barrier of 6 mil poly shall be provided so that the abatement work is not visible to any building occupants. If the area adjacent to the regulated area is accessible to the public, construct a solid barrier on the public side of the sheeting for protection and isolation of the project. The barrier shall be constructed with normal 2" x 4" (50mm x 100mm) wood or metal studs 16" (400mm) on centers, securely anchored to prevent movement and covered with a minimum of ½" (12.5mm) plywood. Provide an appropriate number of OSHA DANGER signs for each visual and physical barrier. Any alternative method must be given a written approval by the VA's representative.

3.15 CRITICAL BARRIERS

- A. The regulated area must be completely separated from the adjacent areas, and the outside by at least 2 layers of 6 mil fire retardant poly and duct tape/spray adhesive. Individually seal all supply and exhaust ventilation openings, lighting fixtures, clocks, doorways, windows, convectors, speakers, and other openings into the regulated area with 2 layers of 6 mil fire retardant poly, and taped securely in place with duct tape/spray adhesive. Critical barriers must remain in place until all work and clearances have been completed.

3.16 EXTENSION OF THE REGULATED AREA

- A. If the regulated area barrier is breached in any manner that could allow the passage of asbestos fibers or debris, the Competent Person shall immediately stop work, continue wetting, and proceed to extend the regulated area to enclose the affected area as per procedures described in this specification. If the affected area cannot be enclosed, decontamination measures and cleanup shall start immediately. All personnel shall be isolated from the affected area until decontamination/cleanup is completed as verified by visual inspection and air monitoring. Air monitoring at completion must indicate background levels or less than 0.01 f/cc.

3.17 FLOOR BARRIERS

- A. If floor removal is not being done, all floors in the regulated area shall be covered with 2 layers of 6 mil fire retardant poly and brought up the wall 12 inches.

3.18 REMOVAL OF CLASS II FLOORING; ROOFING; AND TRANSITE MATERIALS:

- A. All applicable requirements of OSHA, EPA, and DOT shall be followed during Class II work. Keep materials intact; do not disturb; wet while working with it; wrap as soon as possible with 2 layers of 6 mil plastic for disposal.

3.19 REMOVAL OF FLOORING MATERIALS:

- A. All requirements of OSHA Flooring agreement provisions shall be followed:
 - 1. Negative air machine shall be used to effect some negative pressure in the regulated area. A spare machine shall be available.
 - 2. Follow RFCI recommended work practices for removal of resilient Floor coverings.
 - 3. Mechanical chipping or sanding is not allowed.
 - 4. Wet clean and HEPA vacuum the floor before and after removal of flooring.
 - 5. Place a 6 mil poly layer 4' by 10' adjacent to the regulated area for use as a decontaminated area. All waste must be contained in the regulated area.
 - 6. Package all waste in 6 mil poly lined fiberboard drums.

3.20 REMOVAL OF MASTIC

- A. The mastic removal material must be a "low odor" or "no odor" material.
- B. Follow RFCI recommended work practices for removal of mastic.
- C. Package all waste in 6 mil poly lined fiberboard drums.
- D. Prior to application of any liquid material, check the floor for penetrations and seal before removing mastic.
- E. The use of any solvents is prohibited in the removal of mastic.

3.21 DISPOSAL OF CLASS II WASTE MATERIAL:

- A. Package and dispose of waste materials as per this specification. All OSHA, EPA, and DOT requirements must be met. Landfill requirements for packaging must also be met. Disposal of non-friable waste must be done in accordance with applicable regulations.

3.22 PROJECT DECONTAMINATION

- A. The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH.
- B. If the asbestos abatement work is in an area which was contaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal and cleaning of the regulated area surfaces after the primary barrier removal.
- C. If the asbestos abatement work is in an area which was uncontaminated prior to the start of abatement, the decontamination will be done by

cleaning the primary barrier poly prior to its removal, thus preventing contamination of the building when the regulated area critical barriers are removed.

3.23 REGULATED AREA CLEARANCE

- A. Air testing and other requirements which must be met before release of the Contractor and re-occupancy of the regulated area space are specified in Final Testing Procedures.

3.24 WORK DESCRIPTION

- A. Decontamination includes the cleaning and clearance of the air in the regulated area and the decontamination and removal of the enclosures/facilities installed prior to the abatement work including primary/critical barriers, PDF and W/EDF facilities.

3.25 PRE-DECONTAMINATION CONDITIONS

- A. Before decontamination starts, all ACM waste from the regulated area shall be removed, all waste collected and removed, and the secondary barrier of poly removal and disposed of along with any gross debris generated by the work.
- B. At the start of decontamination, the following shall be in place:
 - 1. Critical barriers over all openings consisting of two layers of 6 mil poly which is the sole barrier between the regulated area and the rest of the building or outside.
 - 2. Decontamination facilities, if required for personnel and equipment in operating condition.

3.26. CLEANING:

- A. Clean all surfaces of the regulated area by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping methods. If determined by the CPIH/VPIH/CIH additional cleaning(s) may be needed.

3.27 VISUAL INSPECTION AND AIR CLEARANCE TESTING

- A. Notify the VA representative 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing will be performed by the VPIH/CIH after the cleaning.

3.28 VISUAL INSPECTION

- A. Final visual inspection will include the entire regulated area, all poly sheeting, seals over HVAC openings, doorways, windows, and any other openings. If any debris, residue, dust or any other suspect material is detected, the cleaning shall be repeated at no cost to the VA. Dust/material samples may be collected and analyzed at no cost to the VA at the discretion of the VPIH/CIH to confirm visual findings. When the regulated area is visually clean the final testing can be done.

3.29 AIR CLEARANCE TESTING

- A. After an acceptable final visual inspection by the VPIH/CIH and VA Representative, the VPIH/CIH will perform the final testing. Air samples will be collected and analyzed in accordance with procedures for PCM in this specification. If the release criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures. Additional inspection and testing will be done at the expense of the Contractor.
- B. If the results of the PCM are acceptable, remove the critical barriers. Any small quantities of residue material found upon removal of the poly shall be removed with a HEPA vacuum and localized isolation. If significant quantities are found as determined by the VPIH/CIH, then the entire area affected shall be cleaned as specified in the final cleaning.
- C. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

3.30 FINAL AIR CLEARANCE PROCEDURES

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc as measured with PCM methods.
- B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the VPIH/CIH will secure samples and analyze them according to the following procedures:
 - 1. Fibers Counted: "Fibers" referred to in this section shall be either all fibers regardless of composition as counted in the NIOSH 7400 PCM method.
 - 2. All clearance air testing samples shall be collected on 0.8 μ MCE filters for PCM analysis. Air samples will be collected in areas subject to normal air circulation. A minimum of 5 PCM samples will be collected with at least 1200 Liters of air sampled. All results must be less than 0.01 f/cc for clearance.

3.31 COMPLETION OF ABATEMENT WORK

- A. After thorough decontamination, complete asbestos abatement work upon meeting the regulated area clearance criteria and fulfilling the following:
 - 1. Remove all equipment, materials, and debris from the project area.
 - 2. Package and dispose of all asbestos waste as required.

3. Repair or replace all interior finishes damaged during the abatement work.
4. Fulfill other project closeout requirements as specified elsewhere in this specification.

3.32 CERTIFICATE OF COMPLETION BY CONTRACTOR

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

3.33 WORK SHIFTS

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

ATTACHMENT #1

CERTIFICATE OF COMPLETION

DATE:

PROJECT NAME:

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 glovebag work was done in accordance with OSHA requirements and the manufacturer's recommendations.

CPIH Name:

Signature/Date:

Asbestos Abatement Contractor's Name:

Signature/Date:

EPSTEIN 11270
VA 578-11-094
18MAY12

ATTACHMENT #2

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME:

DATE:

PROJECT ADDRESS:

ABATEMENT CONTRACTOR'S NAME:

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

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

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

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

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

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

Signature:

Printed Name:

Social Security Number:

Witness:

ATTACHMENT #3

AFFIDAVIT OF MEDICAL SURVEILLANCE, RESPIRATORY PROTECTION AND
TRAINING/ACCREDITATION

VA PROJECT NAME AND NUMBER:

VA MEDICAL FACILITY:

ABATEMENT CONTRACTOR'S NAME AND ADDRESS:

1. I verify that the following individual

Name: Social Security Number:

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

Address:

2. I verify that this individual has been trained, fit-tested and instructed in the use of all appropriate respiratory protection systems and that the person is capable of working in safe and healthy manner as expected and required in the expected work environment of this project.
3. I verify that this individual has been trained as required by 29 CFR 1926.1101(k). This individual has also obtained a valid State accreditation certificate. Documentation will be kept on-site.
4. I verify that I meet the minimum qualifications criteria of the VA specifications for a CPIH.

Signature of CPIH:

Date:

Printed Name of CPIH:

Signature of Contractor:

Date:

Printed Name of Contractor:

ATTACHMENT #4

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

VA Project Location:

VA Project #:

VA Project Description:

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

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

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

Abatement Contractor Owner's Signature _____ Date _____

Abatement Contractor Competent Person(s)	Date
--	------

Date _____

Date _____

- - - END- - - -

SECTION 02 82 13.41
ASBESTOS ABATEMENT FOR TOTAL DEMOLITION PROJECTS

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PART 1 - GENERAL

1.1 SUMMARY OF THE WORK

1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS

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

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

1.1.2 EXTENT OF WORK

- A. This work will be asbestos abatement prior to the total demolition of the facility as indicated by the scope of work. RACM discovered during total demolition is also within the scope of this specification. The extent of the abatement is for informational purposes only and is based on the best information available at the time of the specification preparation. The Abatement Contractor shall satisfy themselves as to the extent of the work. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents.
- B. Removal, clean-up and disposal of regulated asbestos containing materials (RACM) and asbestos contaminated elements shall be conducted in approved regulated areas in all areas prior to the beginning of demolition. Any RACM discovered during demolition activity shall be cause for stopping the work. The Demolition Contractor's personnel shall attend an on-site training session related to the types of asbestos at the site and shall not disturb the ACM if found during their work.
- C. No abatement work shall begin in any area unless the Abatement Contractor/Competent Person/VA Representative agreed that all asbestos work requirements as stipulated in the specification have been met. Attachment #4 must be filled out for each abatement area.

1.1.3 RELATED WORK

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

1.1.4 TASKS

The work tasks are summarized briefly as follows:

- A. Asbestos abatement of RACM as required by EPA NESHAP prior to demolition. An EPA/State certified Project Designer must provide a site-specific specification for the asbestos abatement.

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

1.1.5 ABATEMENT CONTRACTOR USE OF PREMISES

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

1.2 STOP ABATEMENT ORDER

- A. If the Contracting Officer; their field representative; (the facility Safety Officer/Manager or their designee, or the VA Professional Industrial Hygienist/Certified Industrial Hygienist (VPIH/CIH) presents a verbal **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and maintain HEPA filtered negative pressure air flow in the containment and adequately wet any exposed ACM. If a verbal Stop Asbestos Removal Order is issued, the VA shall follow-up with a written order to the Contractor as soon as practicable. The Contractor shall not resume any asbestos removal activity until authorized to do so in writing by the VA Contracting Officer. A stop asbestos removal order may be issued at any time the VA Contracting Officer determines abatement conditions/activities are not within VA specification, regulatory requirements or that an imminent hazard exists to human health or the environment. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the VPIH/CIH time. The occurrence of any of the following events shall be reported immediately by the Contractor's competent person to the VA Contracting Office or field representative using the most expeditious means (e.g., verbal or telephonic), followed up with written notification to the Contracting Officer as soon as it is practical. The Contractor shall immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

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

1.3 DEFINITIONS

1.3.1 GENERAL

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

1.3.2 GLOSSARY:

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

Aerosol - Solid or liquid particulate suspended in air.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Competent person - In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.

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

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

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

Decontamination area/unit - An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

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

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

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

Disturbance - Activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM or PACM, no greater than the amount that can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that

which can be contained in one glove bag or disposal bag which shall not exceed 60 inches in length or width.

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

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

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

Encapsulation - Treating ACM with an encapsulant.

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

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

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

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

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

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

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

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

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

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

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

HVAC - Heating, Ventilation and Air Conditioning

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Positive/negative fit check - A method of verifying the seal of a facepiece respirator by temporarily occluding the filters and breathing in (inhaling) and then temporarily occluding the exhalation valve and

breathing out (exhaling) while checking for inward or outward leakage of the respirator respectively.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.3.3 REFERENCED STANDARDS ORGANIZATIONS:

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

- A. VA Department of Veterans Affairs
810 Vermont Avenue, NW
Washington, DC 20420
- B. CFR Code of Federal Regulations
Government Printing Office
Washington, DC 20420
- C. EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460
202-382-3949
- D. MIL-STD Military Standards/Standardization Division
Office of the Assistant Secretary of Defense
Washington, DC 20420
- E. NEC National Electrical Code (by NFPA)
- F. NEMA National Electrical Manufacturer's Association
2101 L Street, N.W.
Washington, DC 20037

- G. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555
- H. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402
- I. DOT Department of Transportation
Washington, DC 20590

1.4 APPLICABLE CODES AND REGULATIONS

1.4.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS:

- A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.
- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these specification exists, the most stringent requirement(s) shall be utilized.
- C. Copies of all standards, regulations, codes and other applicable documents, including this specification and those listed in Section 1.5 shall be available at the worksite in the Abatement Contractor's office area/clean room.

1.4.2 ABATEMENT CONTRACTOR RESPONSIBILITY:

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

1.4.3 FEDERAL REQUIREMENTS:

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

- A. Occupational Safety and Health Administration (OSHA)
 - 1. Title 29 CFR 1926 - Construction Standard Requirements - Demolition Work

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

1.4.4 STATE REQUIREMENTS:

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

1. Illinois Department of Public Health (IDPH) 1. 105 ILCS 105: Illinois Asbestos Abatement Act
2. 77 Ill. Adm. Code 855: Asbestos Abatement for Public and Private Schools and Commercial and Private Buildings in Illinois

1.4.5 LOCAL REQUIREMENTS:

If local city or county requirements are more stringent than federal or state standards, the local standards are to be followed.

1.4.6 PERMITS/LICENSES:

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

1.4.7 POSTING AND FILING OF REGULATIONS:

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

1.4.8 VA RESPONSIBILITIES:

Prior to commencement of work:

- A. Notify occupants adjacent to regulated areas of project dates and requirements for relocation, if needed. Arrangements must be made prior to starting work for relocation of desks, files, equipment, and personal possessions to avoid unauthorized access into the regulated area. **Note: Notification of adjacent personnel is required by OSHA in 29 CFR 1926.1101 (k) to prevent unnecessary or unauthorized access to the regulated area.**
- B. Submit to the Contractor results of background air sampling; including location of samples, person who collected the samples, equipment utilized, calibration data and method of analysis. During abatement, submit to the Contractor, results of bulk material analysis and air sampling data collected during the course of the abatement. This

information shall not release the Contractor from any responsibility for OSHA compliance.

1.4.9 SITE SECURITY

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately require any unauthorized person to leave the regulated area and then notify the VA Contracting Officer or VA Representative using the most expeditious means.
- C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area must record their name, affiliation, time in, and time out for each entry.
- D. Access to the regulated area shall be through a single decontamination unit. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside; however, they shall be sealed with poly sheeting and taped until needed. In any situation where exposure to high temperatures which may result in a flame hazard, fire retardant poly sheeting must be used.
- E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel. A 24 hour security system shall be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.
- F. The Contractor will have the VA's assistance in notifying adjacent personnel of the presence, location and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.
- G. The regulated area shall be locked during non-working hours and secured by VA Representative or Competent Person. The VA Police should be informed of asbestos abatement regulated areas to provide security checks during facility rounds and emergency response.

1.4.10 EMERGENCY ACTION PLAN AND ARRANGEMENTS

- A. An Emergency Action Plan shall be developed by prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a); (b).
- B. Emergency procedures shall be in written form and prominently posted in the clean room and equipment room of the decontamination unit. Everyone, prior to entering the regulated area, must read and sign these procedures to acknowledge understanding of the regulated area layout, location of emergency exits and emergency procedures.

- C. Emergency planning shall include written notification of police, fire, and emergency medical personnel of planned abatement activities; work schedule; layout of regulated area; and access to the regulated area, particularly barriers that may affect response capabilities.
- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
 - 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
 - 2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.
- F. Telephone numbers of any/all emergency response personnel shall be prominently posted in the clean room, along with the location of the nearest telephone.
- G. The Contractor shall provide verification of first aid/CPR training for personnel responsible for providing first aid/CPR. OSHA requires medical assistance within 3-4 minutes of a life-threatening injury/illness. Bloodborne Pathogen training shall also be verified for those personnel required to provide first aid/CPR.
- H. The Emergency Action Plan shall provide for a Contingency Plan in the event that an incident occurs that may require the modification of the standard operating procedures during abatement. Such incidents include, but are not limited to, fire; accident; power failure; negative pressure failure; and supplied air system failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that asbestos abatement work is stopped and wetting is continued until correction of the problem.

1.4.11 ACCIDENT PREVENTION

- A. The Abatement Contractor shall provide and maintain a work environment and procedures which will safeguard the public and VA staff personnel, property, materials, supplies, and equipment which may be adjacent to the Abatement Contractor's regulated areas. The Abatement Contractor will avoid interruptions of VA operations so the project will be completed on schedule.
- B. While performing abatement activities, the Abatement Contractor shall provide all/any required safety barricades, signs, and signal lights. The Abatement Contractor shall comply with all applicable standards related to abatement operations as mandated by OSHA/EPA/State Standards. The Abatement Contractor shall provide a copy of and comply with the pertinent provisions of the latest version of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1.
- C. Whenever the Contracting Officer (CO) becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or VA patients/personnel, the CO shall notify the Abatement Contractor's Competent Person orally, with written confirmation and request

immediate corrective action(s) be taken to abate the noncompliant condition. This notice, when delivered to the Abatement Contractor or the Contractor's representative, shall be deemed sufficient notice of noncompliance and that corrective action is required. The Abatement Contractor shall take corrective action immediately upon receipt of the oral/written notice.

- D. If the Abatement Contractor fails or refuse to promptly take corrective action, the CO has the option to issue an order to stop all or part of the work until correction actions have been taken. The Abatement Contractor shall have no entitlement to any equitable adjustment of the contract price or extension of the performance schedule based on any stop work order issued under this clause.
- E. The Abatement Contractor shall include the provisions of 1.4.11 in any subcontractor agreement.
- F. The Abatement Contractor shall submit a written plan for implementing 1.4.11. The plan shall include an analysis of any significant hazards to life, limb, and property inherent to abatement work and a plan for controlling these hazards.
- G. The COTR or other designated VA employee, if designated by the CO, shall serve as the Safety Officer and has authority to enforce the Accident Prevention requirements.

1.4.12 PRE-CONSTRUCTION MEETING

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

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

- I. Procedures for handling, packaging and disposal of asbestos waste.
- J. Emergency Action Plan and Contingency Plan Procedures.

SPEC WRITER NOTE: All required and additional submittals should be listed.

1.5 ABATEMENT PROJECT COORDINATION

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

1.5.1 PERSONNEL

- A. Administrative and supervisory personnel shall consist of a qualified Competent Person(s) as defined by OSHA in the Construction Standards and the Asbestos Construction Standard; Contractor Professional Industrial Hygienist and Industrial Hygiene Technicians. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements.
- B. Non-supervisory personnel shall consist of an adequate number of qualified personnel to meet the schedule requirements of the project. Personnel shall meet required qualifications. Personnel utilized on-site shall be pre-approved by the VA representative. A request for approval shall be submitted for any person to be employed during the project giving the person's name; social security number; qualifications; accreditation card with color picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.
- C. Minimum qualifications for Contractor and assigned personnel are:
 - 1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of federal (and state as applicable) EPA and OSHA asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work as required by the state; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; has adequate materials, equipment and supplies to perform the work.
 - 2. The Competent Person has four (4) years of abatement experience of which two (2) years were as the Competent Person on the project; meets the OSHA definition of a Competent Person; has been the Competent Person on two (2) projects of similar size and complexity as this project within the past three (3) years; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.
 - 3. The Contractor Professional Industrial Hygienist/CIH (CPIH/CIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete standard operating procedure for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course or equivalent, Contractor/Supervisor course;

and has appropriate medical/respiratory protection records/documentation.

4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience within the past three (3) years of similar size and complexity; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

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

1.6 WORKER PROTECTION

1.6.1 TRAINING OF ABATEMENT PERSONNEL

- A. Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site. The OSHA Construction Safety 10 Hour course shall be required for all on-site contractors' personnel.

1.6.2 PERSONAL PROTECTIVE EQUIPMENT

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

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

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

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

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

1.7.3 SELECTION AND USE OF RESPIRATORS

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

1.7.4 MINIMUM RESPIRATORY PROTECTION

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

1.7.5 MEDICAL WRITTEN OPINION

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

1.7.6 RESPIRATOR FIT TEST

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

1.7.7 RESPIRATOR FIT CHECK

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

1.7.8 MAINTENANCE AND CARE OF RESPIRATORS:

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

1.7.9 SUPPLIED AIR SYSTEMS

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

competent person on site will be responsible for the supplied air system to ensure the safety of the worker.

1.8 WORKER PROTECTION

1.8.1 MEDICAL EXAMINATIONS

- A. Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. A current physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the medical opinion the person has been evaluated for working in a heat and cold stress environment while wearing personal protective equipment (PPE) and is able to perform the work without risk of material health impairment.

1.8.2 PROTECTIVE CLOTHING

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

1.8.3 REGULATED AREA ENTRY PROCEDURE

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

1.8.4 DECONTAMINATION PROCEDURE

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

- A. When exiting the regulated area, remove disposable coveralls, and ALL other clothes, disposable head coverings, and foot coverings or boots in the equipment room.
- B. Still wearing the respirator and completely naked, proceed to the shower. Showering is MANDATORY. Care must be taken to follow reasonable procedures in removing the respirator to avoid inhaling asbestos fibers while showering. The following procedure is required as a minimum:
 1. Thoroughly wet body including hair and face. If using a PAPR hold blower above head to keep filters dry.
 2. With respirator still in place, thoroughly decontaminate body, hair, respirator face piece, and all other parts of the respirator except the blower and battery pack on a PAPR. Pay particular attention to cleaning the seal between the face and respirator facepiece and under the respirator straps.

3. Take a deep breath, hold it and/or exhale slowly, completely wetting hair, face, and respirator. While still holding breath, remove the respirator and hold it away from the face before starting to breathe.
- C. Carefully decontaminate the facepiece of the respirator inside and out. If using a PAPR, shut down using the following sequence: a) first cap inlets to filters; b) turn blower off to keep debris collected on the inlet side of the filter from dislodging and contaminating the outside of the unit; c) thoroughly decontaminate blower and hoses; d) carefully decontaminate battery pack with a wet rag being cautious of getting water in the battery pack thus preventing destruction. **(THIS PROCEDURE IS NOT A SUBSTITUTE FOR RESPIRATOR CLEANING!)**.
- D. Shower and wash body completely with soap and water. Rinse thoroughly.
- E. Rinse shower room walls and floor to drain prior to exiting.
- F. Proceed from shower to clean room; dry off and change into street clothes or into new disposable work clothing.

1.8.5 REGULATED AREA REQUIREMENTS

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

1.9 DECONTAMINATION FACILITIES

1.9.1 DESCRIPTION

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

1.9.2 GENERAL REQUIREMENTS

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

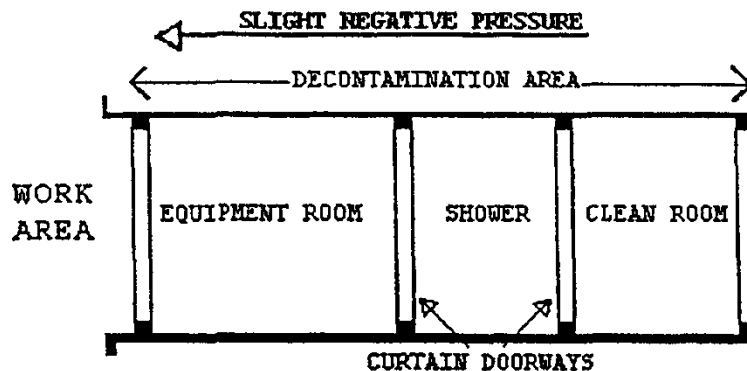
1.9.3 TEMPORARY FACILITIES TO THE PDF AND EWDF

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

1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)

- 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 insure all employees can complete the entire decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.
1. Clean Room: The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 3 layers of 6 mil opaque fire retardant poly to provide an air tight room. Provide a minimum of 2 - 900 mm (3 foot) wide 6 mil poly opaque fire retardant doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. Provide 1 storage locker per person. A portable fire extinguisher, minimum 10 pounds capacity, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.
 2. Shower Room: The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using air tight walls made from at least 3 layers of 6 mil opaque fire retardant poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary

- condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Waste water will be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters will be changed a minimum of daily or more often as needed. Filter changes must be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.
3. Equipment Room: The Competent Person shall provide an equipment room which shall be an air tight compartment for the storage of work equipment/tools, reusable personal protective equipment, except for a respirator and for use as a gross decontamination area for personnel exiting the regulated area. The equipment room shall be separated from the regulated area by a minimum 3 foot wide door made with 2 layers of 6 mil opaque fire retardant poly. The equipment room shall be separated from the regulated area, the shower room and the rest of the building by air tight walls and ceiling constructed of a minimum of 3 layers of 6 mil opaque fire retardant poly. Damp wipe all surfaces of the equipment room after each shift change. Provide an additional loose layer of 6 mil fire retardant poly per shift change and remove this layer after each shift. If needed, provide a temporary electrical sub-panel equipped with GFCI in the equipment room to accommodate any equipment required in the regulated area.
 4. The PDF shall be as follows: Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF shall be a minimum of 2 layers of 6 mil opaque fire retardant poly.

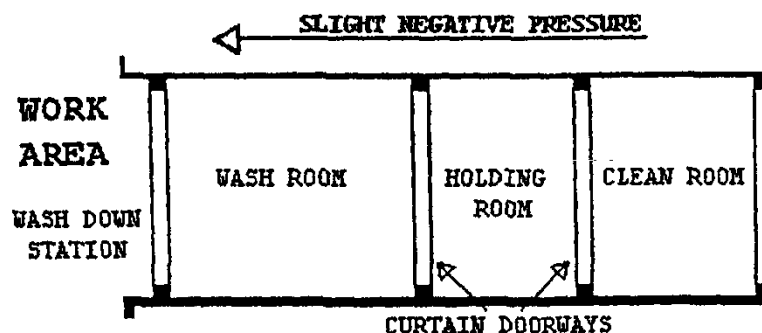


1.9.5 EQUIPMENT/WASTE DECONTAMINATION FACILITY (EWDF)

- A. The Competent Person shall provide a W/EDF consisting of a wash room, holding room, and clean room for removal of waste, equipment and contaminated material from the regulated area. Personnel shall not enter or exit the W/EDF except in the event of an emergency. Clean debris and residue in the W/EDF daily. All surfaces in the W/EDF shall

be wiped/hosed down after each shift and all debris shall be cleaned from the shower pan. The W/EDF shall consist of the following:

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



1.9.6 EQUIPMENT/WASTE DECONTAMINATION PROCEDURES:

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

and/or bags. After cleaning and inspection, pass items into the Holding Room. Close all doorways except the doorway between the Holding Room and the Clean Room. Workers from the Clean Room/Exterior shall enter the Holding Room and remove the decontaminated/cleaned equipment/bags for removal and disposal. These personnel will not be required to wear PPE. At no time shall personnel from the clean side be allowed to enter the Wash Room.

PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT

2.1 MATERIALS AND EQUIPMENT

2.1.1 GENERAL REQUIREMENTS (ALL ABATEMENT PROJECTS)

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

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

electrically operated hand tools, equipment, electric cords shall be connected to GFCI protection.

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

2.1.1.2 NEGATIVE PRESSURE FILTRATION SYSTEM

- A. The Contractor shall provide enough HEPA negative air machines to continuously maintain a pressure differential of -0.02" water column gauge. The Competent Person shall determine the number of units needed for the regulated area by dividing the cubic feet in the regulated area by 15 and then dividing that result by the cubic feet per minute (CFM) for each unit to determine the number of units needed to continuously maintain a pressure differential of -0.02" WCG. Provide a standby unit in the event of machine failure and/or emergency in an adjacent area.
- B. NIOSH has done extensive studies and has determined that negative air machines typically operate at ~50% efficiency. The contractor shall consider this in their determination of number of units needed to continuously maintain a pressure differential of -0.02" water column gauge. The contractor shall use 8 air changes per hour or double the number of machines, based on their calculations, or submit proof their machines operate at stated capacities, at a 2" pressure drop across the filters.

2.1.1.3 DESIGN AND LAYOUT

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

2.1.4 NEGATIVE AIR MACHINES (HEPA UNITS)

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

- H. It is essential that replacement HEPA filters be tested using an "in-line" testing method, to ensure the seal around the periphery was not damaged during replacement. Damage to the outer HEPA filter seal could allow contaminated air to bypass the HEPA filter and be discharged to an inappropriate location. Contractor will provide written documentation of test results for negative air machine units with HEPA filters changed by the contractor or documentation when changed and tested by the contractor filters.

2.1.5 PRESSURE DIFFERENTIAL

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

2.1.6 MONITORING

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

2.1.7 AUXILIARY GENERATOR

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

2.1.8 SUPPLEMENTAL MAKE-UP AIR INLETS

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

2.1.9 TESTING THE SYSTEM

- A. The negative pressure system must be tested before any ACM is disturbed in any way. After the regulated area has been completely prepared, the decontamination units set up, and the negative air machines installed, start the units up one at a time. Demonstrate and document the operation and testing of the negative pressure system to the VA using smoke tubes and a negative pressure gauge. Verification and documentation of adequate negative pressure differential across each barrier must be done at the start of each work shift.

2.1.10 DEMONSTRATION OF THE NEGATIVE AIR PRESSURE SYSTEM

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

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

2.1.11 USE OF SYSTEM DURING ABATEMENT OPERATIONS

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

2.1.12 DISMANTLING THE SYSTEM

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

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA**2.2.1 GENERAL**

- A. Seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All surfaces in the regulated area must be covered to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated as a result of the work, shall immediately stop work and clean up the contamination at no additional cost to the VA. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section - FIRESTOPPING.

2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA

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

2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

2.2.4 CRITICAL BARRIERS

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

2.2.5 PRIMARY BARRIERS

- A. Cover the regulated area with two layers of 6 mil fire retardant poly on the floors and two layers of 4 mil, fire retardant poly on the walls, unless otherwise directed in writing by the VA representative. Floor layers must form a right angle with the wall and turn up the wall at least 300 mm (12"). Seams must overlap at least 1800 mm (6') and must be spray glued and taped. Install sheeting so that layers can be removed independently from each other. Carpeting shall be covered with three layers of 6 mil poly. Corrugated cardboard sheets must be placed between the bottom and middle layers of poly. Mechanically support and seal with duct tape and glue all wall layers.
- B. Elevator doors must be covered with 2 layers of 6 mil fire retardant poly. The elevator door must be in a positively pressurized area outside the clean room of the PDF.
- C. If stairs and ramps are covered with 6 mil plastic, two layers must be used. Provide 19 mm (3/4") exterior grade plywood treads held in place with duct tape/glue on the plastic. Do not cover rungs or rails with any isolation materials.

2.2.6 SECONDARY BARRIERS

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

2.2.7 EXTENSION OF THE REGULATED AREA

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

2.2.8 FIRESTOPPING

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

2.3 MONITORING, INSPECTION AND TESTING

2.3.1 GENERAL

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. OSHA requires that the Employee exposure to asbestos must not exceed 0.1 fibers per cubic centimeter (f/cc) of air, averaged over an 8-hour work shift. The CPIH/CIH is responsible for and shall inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH/CIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.
- B. The VA will employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH will perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due

to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.

- C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH with review and approval of the VPIH/CIH. An agreement between the CPIH/CIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

2.3.2 SCOPE OF SERVICES OF THE VPIH CONSULTANT

- A. The purpose of the work of the VPIH/CIH is to: assure quality; adherence to the specification; resolve problems; prevent the spread of contamination beyond the regulated area; and assure clearance at the end of the project. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:
 1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
 2. Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.
 3. Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
 4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of conflicts, interpret data, etc.
 5. Task 5: Perform, in the presence of the VA representative, final inspection and testing of a decontaminated regulated area at the conclusion of the abatement to certify compliance with all regulations and VA requirements/specifications.
 6. Task 6: Issue certificate of decontamination for each regulated area and project report.
- B. All documentation, inspection results and testing results generated by the VPIH/CIH will be available to the Contractor for information and consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.

- C. The monitoring and inspection results of the VPIH/CIH will be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated..
- D. All air sampling and analysis data will be recorded on VA Form 10-0018.

2.3.3 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH/CIH

- A. The Contractor's CPIH/CIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH/CIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor's personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in sampling and analysis. The IH Technician shall have successfully completed a NIOSH 582 Course or equivalent and provide documentation. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA AHERA/State Contractor/Supervisor or Abatement Worker and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation on substantially similar projects in size and scope. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT and approved by the VA prior to start of the project. A daily log, shall be maintained by the CPIH/CIH or IH Technician, documenting all OSHA requirements for air personal monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH upon request. The log will contain, at a minimum, information on personnel or area samples, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH/CIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH/CIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH/CIH responsibilities. Additionally, the CPIH/CIH will monitor and record pressure readings within the containment daily with a minimum of two readings at the beginning and at the end of a shift, and submit the data in the daily report.

2.4 ASBESTOS HAZARD ABATEMENT PLAN

The Contractor shall have established Asbestos Hazard Abatement Plan (AHAP) in printed form and loose leaf folder consisting of simplified text, diagrams, sketches, and pictures that establish and explain

clearly the procedures to be followed during all phases of the work by the Contractor's personnel. The AHAP must be modified as needed to address specific requirements of this project and the specifications. The AHAP(s) shall be submitted for review and approval to the VA prior to the start of any abatement work. The minimum topics and areas to be covered by the AHAP(s) are:

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

2.5 SUBMITTALS

2.5.1 PRE-CONSTRUCTION MEETING SUBMITTALS

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

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Asbestos Hazard Abatement Plan developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH/CIH.
- D. Submit the specifics of the materials and equipment to be used for this project with manufacturer names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
 - 1. Supplied air system, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.

2. Waste water filtration system, shower system, containment barriers.
 3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, and fire extinguishers.
 4. Respirators, protective clothing, personal protective equipment.
 5. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.
- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Personal air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A. And area or clearance air monitoring in accordance with EPA AHERA protocols.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
 2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; Resolution
 3. List asbestos regulatory citations (e.g., OSHA), notices of violations (e.g., Federal and state EPA), penalties, and legal actions taken against the company including and of the company's officers (including damages paid) in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH/CIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and written respiratory protection program, and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
1. CPIH/CIH and IH Technician: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of AHAP(s) developed; medical opinion; and current respirator fit test.
 2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects in size/complexity as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training;

- maximum number of personnel supervised on a project; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
 - J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain language the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of AHAP(s) incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who performs and how is personal air monitoring of abatement workers conducted; a list of references of independent laboratories/IHs familiar with your air monitoring and AHAP(s); and copies of monitoring results of the five referenced projects listed and analytical method(s) used.
 - K. Rented equipment must be decontaminated prior to returning to the rental agency.
 - L. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants, all MSDS and application instructions.

2.5.2 SUBMITTALS DURING ABATEMENT

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWA's/EL's. Submit this information daily to the VPIH/CIH.
- B. The CPIH/CIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work:
 1. Inspection and approval of the regulated area preparation prior to start of work and daily during work.
 2. Removal of any poly barriers.
 3. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
 4. Packaging and removal of ACM waste from regulated area.
 5. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the VA's representative on a weekly basis.

2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT

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

Representative will retain the abatement report after completion of the project and provide copies of the abatement report to VAMC Office of Engineer and the Safety Office.

PART 3 - EXECUTION

3.1 PRE-ABATEMENT ACTIVITIES

3.1.1 PRE-ABATEMENT MEETING

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

3.1.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS

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

3.1.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS

- A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
- B. Upon completion of all preparatory work, the CPIH will inspect the work and systems and will notify the VA's representative when the work is completed in accordance with this specification. The VA's representative may inspect the regulated area and the systems with the VPIH and may require that upon satisfactory inspection, the abatement contractor's employees perform all major aspects of the approved AHAP, especially worker protection, respiratory systems, contingency plans,

decontamination procedures, and monitoring to demonstrate satisfactory operation. The operational systems for respiratory protection and the negative pressure system shall be demonstrated for proper performance.

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

3.2 REGULATED AREA PREPARATIONS

- A. Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed the PEL. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.
- B. Shut down and lock out/tag out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.
- C. Shut down and lock out/tag out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6-mil polyethylene disposal bags for staging and eventual disposal as asbestos waste.
- D. The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.
- E. The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention. The Contractor shall be responsible for hot water provision to the shower(s).
- F. The Contractor shall not allow unauthorized persons into the regulated area without the written permission of the VPIH.

3.3 CONTAINMENT COVERINGS FOR THE REGULATED AREA

3.3.1 GENERAL

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

3.3.2 PREPARATION PRIOR TO SEALING OFF

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

3.3.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

3.3.4 CRITICAL BARRIERS

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

3.3.5 PRIMARY/SECONDARY BARRIERS

- A. Floors: Cover the floor of the regulated area with at least two layers of 6 mil, fire retardant poly, turning up the walls at least 12" (300mm). The poly must form a right angle at the floor-wall juncture so there is no radius which can be stepped on, possibly causing detachment of the poly. Spray glue and duct tape must both be used for floor seams. Floor seams must overlap a minimum of 6 feet (1800mm) or be at right angles to each other. The top sheet of poly must be able to be removed independently of the bottom layer. A third loose layer of 6 mil poly shall be used in the area of removal and periodically picked up to reduce contamination of the initial layers.

- B. Walls: All walls in the regulated area, including critical barriers, shall be covered with 2 layers of 4 mil fire retardant poly, mechanically supported and sealed with duct tape and/or spray glue. Tape all joints, including the floor-wall joint, with duct tape/spray glue. All wall joints must overlap at least 6 feet (1800mm).
NOTE: The VA or State requirements may require the use of 6 mil poly.
- C. Stairs and Ramps: Stairs or ramps covered in poly must be provided with 3/4" (36mm) exterior grade plywood treads securely held in place over the poly. Do not cover stairs or ramps with unsecured poly. Do not cover rungs or rails with any protective materials.

3.3.6 EXTENSION OF THE REGULATED AREA

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

3.4 REMOVAL OF RACM AND ACE

3.4.1 WETTING MATERIALS

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

3.4.2 WET REMOVAL OF ACM OTHER THAN AMOSITE

- A. Adequately and thoroughly wet the ACM to be removed prior to removal to reduce/prevent fiber release to the air. Adequate time must be allowed for the amended water to saturate the ACM. Abatement personnel must not disturb dry ACM. Use a fine spray of amended water or removal encapsulant. Saturate the material sufficiently to wet to the substrate without causing excessive dripping. The material must be sprayed repeatedly/continuously during the removal process in order to maintain adequately wet conditions. Removal encapsulants must be applied in accordance with the manufacturer's written instructions. Perforate or carefully separate, using wet methods, an outer covering that is painted or jacketed in order to allow penetration and wetting of the material. Where necessary, carefully remove covering while wetting to minimize fiber release. **In no event shall dry removal occur except in the case of electrical hazards or a greater safety issue is possible (needs a variance prior to abatement)!**

- B. If ACM does not wet well with amended water due to coating or jacketing, remove as follows:
1. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
 2. Remove saturated ACM in small sections. Do not allow material to dry out. As material is removed, bag material, while still wet into disposal bags. Twist the bag neck tightly, bend over (gooseneck) and seal with a minimum of three tight wraps of duct tape. Clean /decontaminate the outside of the bag of any residue and move to washdown station adjacent to W/EDF.
 3. Fireproofing or Architectural Finish on Scratch Coat: Spray with a fine mist of amended water or removal encapsulant. Allow time for saturation to the substrate. Do not oversaturate causing excess dripping. Scrape material from substrate. Remove material in manageable quantities and control falling to staging or floor. If the falling distance is over 20 feet (6 meters), use a drop chute to contain material through descent. Remove residue remaining on the scratch coat after scraping is done using a stiff bristle hand brush. If a removal encapsulant is used, remove residue completely before the encapsulant dries. Periodically re-wet the substrate with amended water as needed to prevent drying of the material before the residue is removed from the substrate.
 4. Fireproofing or Architectural Finish on Wire Lath: Spray with a fine mist of amended water or removal encapsulant. Allow time to completely saturate the material. Do not oversaturate causing excess dripping. If the surface has been painted or otherwise coated, cut small holes as needed and apply amended water or removal encapsulant from above. Cut saturated wire lath into 2' x 6' (50mm x 150mm) sections and cut hanger wires. Roll up complete with ACM, cover in burlap and hand place in disposal bag. Do not drop to floor. After removal of lath/ACM, remove any overspray on decking and structure using stiff bristle nylon brushes. Depending on hardness of overspray, scrapers may be needed for removal.
 5. Pipe/Tank/Vessel/Boiler Insulation: Remove the outer layer of wrap while spraying with amended water in order to saturate the ACM. Spray ACM with a fine mist of amended water or removal encapsulant. Allow time to saturate the material to the substrate. Cut bands holding pre-formed pipe insulation sections. Slit jacketing at the seams, remove and hand place in a disposal bag. Do not allow dropping to the floor. Remove molded fitting insulation/mud in large pieces and hand place in a disposal bag. Remove any residue on pipe or fitting with a stiff bristle nylon brush. In locations where pipe fitting insulation is removed from fibrous glass or other non-asbestos insulated straight runs of pipe, remove fibrous material at least 6" from the point it contacts the ACM.

3.4.3 WET REMOVAL OF AMOSITE

- A. The following areas shown on drawings indicate locations of amosite ACM which will require local exhaust ventilation and collection as described below, in addition to wet removal. Provide specific description/ locations/drawings.

- B. Provide local exhaust ventilation and collection systems to assure collection of amosite fibers at the point of generation. A 300 mm (12") flexible rigid non-collapsing duct shall be located no more than 600 mm (2') from any scraping/brushing activity. Primary filters must be replaced every 30 minutes on the negative air machines. Each scraping/brushing activity must have a negative air machine devoted to it. For pre-molded pipe insulation or cutting wire lathe attach a 1200 mm (4') square flared end piece on the intake of the duct. Support the duct horizontally at a point 600 mm (2') below the work to effect capture. One person in the crew shall be assigned to operate the duct collection system on a continual basis.
- C. Amosite does not wet well with amended water. Submit full information/documentation on the wetting agent proposed prior to start for review and approval by the VA Representative. Insure that the material is worked on in small sections and is thoroughly and continuously wetted. Package as soon as possible while wet. Remove as required.

3.4.4 REMOVAL OF RACM CONTAMINATED SOIL AND OTHER SPECIAL PROCEDURES:

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

3.4.5 GLOVEBAG REMOVAL PROCEDURES

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

3.5 DISPOSAL OF RACM AND ACE WASTE MATERIALS

3.5.1 GENERAL

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

3.5.2 PROCEDURES

- A. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification. Waste shall be double-bagged prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall be securely sealed to prevent accidental opening and/or leakage. The top shall be tightly twisted and goose necked prior to tightly sealing with at least three wraps of duct tape. Ensure that unauthorized persons do not have access to the waste material once it is outside the regulated area. All transport containers must be covered at all times when not in use. NESHAP signs must be on containers during loading and unloading. Material shall not be transported in open vehicles. If drums are used

for packaging, the drums shall be labeled properly and shall not be re-used.

- B. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second bag.
- C. Asbestos waste with sharp edged components, i.e., nails, screws, lath, strapping, tin sheeting, jacketing, metal mesh, etc., which might tear poly bags shall be wrapped securely in burlap before packaging and, if needed, use a poly lined fiber drum as the second container, prior to disposal.
- D. The VA will be notified of any waste removed from the containment prior to 24 hours.

3.6 PROJECT DECONTAMINATION

3.6.1 GENERAL

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

3.6.2 REGULATED AREA CLEARANCE

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

3.6.3 WORK DESCRIPTION

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

3.6.4 PRE-DECONTAMINATION CONDITIONS

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

3.6.5 CLEANING

- A. Carry out a first cleaning of all surfaces of the regulated area including items of remaining poly sheeting, tools, scaffolding, ladders/staging by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping/air blowing methods. Use each surface of a wetted cleaning cloth one time only and then dispose of as contaminated waste.

Continue this cleaning until there is no visible residue from abated surfaces or poly or other surfaces. Remove all filters in the air handling system and dispose of as ACM waste in accordance with these specifications. The negative pressure system shall remain in operation during this time. Additional cleaning(s) may be needed as determined by the CPIH/VPIH/CIH.

3.7 VISUAL INSPECTION AND AIR CLEARANCE TESTING

3.7.1 GENERAL

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

3.7.2 VISUAL INSPECTION

- A. The CPIH/CIH and VPIH/CIH will perform a thorough and detailed visual inspection at the end of the cleaning to determine whether there is any visible residue in the regulated area. If the visual inspection is acceptable, the CPIH/CIH will perform pre-clearance sampling using aggressive clearance as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). If the sampling results show values below 0.01 f/cc, then the Contractor shall notify the VA's representative of the results with a brief report from the CPIH/CIH documenting the inspection and sampling results and a statement verifying that the regulated area is ready for lockdown encapsulation. The VA reserves the right to utilize their own VPIH/CIH to perform a pre-clearance inspection and testing for verification.

3.7.3 AIR CLEARANCE TESTING

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

3.7.4 AIR CLEARANCE PROCEDURES

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

3.7.5 CLEARANCE SAMPLING USING PCM

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

3.8 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE**3.8.1 COMPLETION OF ABATEMENT WORK**

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

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

3.8.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

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

3.8.3 WORK SHIFTS

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

ATTACHMENT #1**CERTIFICATE OF COMPLETION**

DATE: _____ VA Project #: _____

PROJECT NAME: _____ Abatement Contractor: _____

VAMC/ADDRESS: _____

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

CPIH/CIH Signature/Date: _____

CPIH/CIH Print Name: _____

Abatement Contractor Signature/Date: _____

Abatement Contractor Print Name: _____

ATTACHMENT #2

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME: _____ DATE: _____

PROJECT ADDRESS: _____

ABATEMENT CONTRACTOR'S NAME: _____

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

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

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

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

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

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

Signature: _____

Printed Name: _____

Social Security Number: _____

Witness: _____

ATTACHMENT #3

AFFIDAVIT OF MEDICAL SURVEILLANCE, RESPIRATORY PROTECTION AND TRAINING/ACCREDITATION

VA PROJECT NAME AND NUMBER: _____

VA MEDICAL FACILITY: _____

ABATEMENT CONTRACTOR'S NAME AND ADDRESS: _____

1. I verify that the following individual

Name: _____ Social Security Number: _____

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

Address: _____

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

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

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

Signature of CPIH/CIH: _____ Date: _____

Printed Name of CPIH/CIH: _____

Signature of Contractor: _____ Date: _____

Printed Name of Contractor: _____

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

VA Project Location: _____

VA Project #: _____

VA Project Description: _____

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

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

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

Abatement Contractor Owner's Signature _____ Date _____

Abatement Contractor Competent Person(s) _____ Date _____

- - - END - - -

SECTION 02 83 33.13
LEAD-BASED PAINT REMOVAL AND DISPOSAL

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 RELATED WORK

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

1.3 APPLICABLE PUBLICATIONS

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

- C. National Fire Protection Association (NFPA):
NFPA 701-2004.....Methods of Fire Test for Flame-Resistant
Textiles and Films
- D. National Institute for Occupational Safety And Health (NIOSH)
NIOSH OSHA Booklet 3142. Lead in Construction
- E. Underwriters Laboratories (UL)
UL 586-1996 (Rev 2004).. High-Efficiency, Particulate, Air Filter
Units
- F. American National Standards Institute
Z9.2-2001.....Fundamentals Governing the Design and Operation
of Local Exhaust Systems
Z88.2-1992.....Respiratory Protection

1.4 DEFINITIONS

- A. Action Level: Employee exposure, without regard to use of respirations, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period. As used in this section, "30 micrograms per cubic meter of air" refers to the action level.
- B. Area Monitoring: Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially exposed to lead.
- C. Physical Boundary: Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area."
- D. Certified Industrial Hygienist (CIH): As used in this section, refers to an Industrial Hygienist employed by the Contractor and is certified by the American Board of Industrial Hygiene in comprehensive practice.
- E. Change Rooms and Shower Facilities: Rooms within the designated physical boundary around the lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross- contamination.
- F. Competent Person: A person capable of identifying lead hazards in the work area and is authorized by the contractor to take corrective action.
- G. Decontamination Room: Room for removal of contaminated personal protective equipment (PPE).
- H. Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.
- I. High Efficiency Particulate Air (HEPA) Filter Equipment: HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting

and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron size particles.

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

1.5 QUALITY ASSURANCE

- A. Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1926.62 (I) (1) (i) & (ii). The examination shall not be required if adequate records show that employees have been examined as required by 29 CFR 1926.62(I) without the last year.
- B. Medical Records: Maintain complete and accurate medical records of employees in accordance with 29 CFR 1910.20.
- C. CIH Responsibilities: The Contractor shall employ a certified Industrial Hygienist who will be responsible for the following:
 - 1. Certify Training.
 - 2. Review and approve lead-containing paint removal plan for conformance to the applicable referenced standards.
 - 3. Inspect lead-containing paint removal work for conformance with the approved plan.
 - 4. Direct monitoring.
 - 5. Ensure work is performed in strict accordance with specifications at all times.

6. Ensure hazardous exposure to personnel and to the environment are adequately controlled at all times.
- D. Training: Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment, in accordance with 29 CFR 1926.62.
- E. Training Certification: Submit certificates signed and dated by the CIH and by each employee stating that the employee has received training.
- F. Respiratory Protection Program:
 1. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every 6 months thereafter as required by 29 CFR 1926.62.
 2. Establish and implement a respiratory protection program as required by 29 CFR 1910.134, 29 CFR 1910.1025, and 29 CFR 1926.62.
- G. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1910.1200.
- H. Hazardous Waste Management: The Hazardous Waste Management plan shall comply with applicable requirements of Federal, State, and local hazardous waste regulations and address:
 1. Identification of hazardous wastes associated with the work.
 2. Estimated quantities of wastes to be generated and disposed of.
 3. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact.
 4. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
 5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
 6. Spill prevention, containment, and cleanup contingency measures to be implemented.
 7. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.
 8. Cost for hazardous waste disposal according to this plan.
- I. Safety and Health Compliance:
 1. In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, state, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1910.1025.

Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work.

2. Where specification requirements and the referenced documents vary, the most stringent requirements shall apply.
3. The following local laws, ordinances, criteria, rules and regulations regarding removing, handling, storing, transporting, and disposing of lead-contaminated materials apply:

1. 410 ILCS 45: Illinois Lead Poisoning Prevention Act
2. 7-4-110 & 7-4-120: Municipal Code of the City of Chicago
3. 77IAC845: Illinois Lead Poisoning Prevention Code (Revision 8/1/2000)
4. 29 CFR 1910: US OSHA General Industry Standards
5. 29 CFR 1926: US OSHA Construction Standards
6. HUD Guidelines: Lead Based Paint: Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing, except Chapter Seven (1995); Chapter 7 of the Guidelines, Lead Based Paint Inspection (Revised, 1997)
7. 40 CFR Part 61: US EPA National Emissions Standards for Hazardous Air Pollutants (NESHAP)
8. 40 CFR Part 261: Identification and Listing of Hazardous Waste (Resource Conservation and Recovery Act, RCRA)
9. USEPA: The renovation, Repair, and Painting Rules (RRP Rules)

- J. Pre-Construction Conference: Along with the CIH, meet with the Contracting Officer to discuss in detail the lead-containing paint removal work plan, including work procedures and precautions for the work plan.

1.6 SUBMITTALS

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

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

PART 2 PRODUCTS

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

PART 3 EXECUTION**3.1 PROTECTION**

- A. Notification: Notify the Contracting Officer 10 days prior to the start of any paint removal work.
- B. Lead Control Area Requirements.
 - 1. Establish a lead control area by completely enclosing with 6-mil poly the area or structure where lead-containing paint removal operations will be performed.
 - 2. Contain removal operations by the use of a negative pressure full containment system with at least one change room and with HEPA filtered exhaust.
- C. Protection of Existing Work to Remain: Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition.
- D. Boundary Requirements: Provide physical boundaries around the lead control area by roping off the area [designated on the drawings] or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.
- E. Heating, Ventilating and Air Conditioning (HVAC) Systems: Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6-mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area.
- F. Change Room and Shower Facilities: Provide clean change rooms and shower facilities within the physical boundary around the designated lead control area in accordance with requirements of 29 CFR 1926.62.
- G. Mechanical Ventilation System:
 - 1. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.57.
 - 2. To the extent feasible, use fixed local exhaust ventilation connected to HEPA filters or other collection systems, approved by the industrial hygienist. Local exhaust ventilation systems shall be

designed, constructed, installed, and maintained in accordance with ANSI Z9.2.

3. If air from exhaust ventilation is recirculated into the work place, the system shall have a high efficiency filter with reliable back-up filter and controls to monitor the concentration of lead in the return air and to bypass the recirculation system automatically if it fails. Air may be recirculated only where exhaust to the outside is not feasible.
- H. Personnel Protection: Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been given appropriate training and protective equipment.
- I. Warning Signs: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

3.2 WORK PROCEDURES

- A. Perform removal of lead-containing paint in accordance with approved lead-containing paint removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-containing paint is removed in accordance with 29 CFR 1926.62, except as specified herein. Dispose of removed paint chips and associated waste in compliance with Environmental Protection Agency (EPA), federal, state, and local requirements.
- B. Personnel Exiting Procedures:
 1. Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:
 - a. Vacuum themselves off.
 - b. Remove protective clothing in the decontamination room, and place them in an approved impermeable disposal bag.
 - c. Shower.
 - d. Change to clean clothes prior to leaving the physical boundary designated around the lead-contaminated job site.
- C. Monitoring: Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1910.1025 and as specified herein. Air monitoring, testing, and reporting shall be performed by a CIH or an Industrial Hygiene (IH) Technician who is under the direction of the CIH:

1. The CIH or the IH Technician under the direction of the CIH shall be on the job site directing the monitoring, and inspecting the lead-containing paint removal work to ensure that the requirements of the Contract have been satisfied during the entire lead-containing paint removal operation.
2. Take personal air monitoring samples on employees who are anticipated to have the greatest risk of exposure as determined by the CIH. In addition, take air monitoring samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
3. Submit results of air monitoring samples, signed by the CIH, within 36 hours after the air samples are taken. Notify the Contracting Officer immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area.

D. Monitoring During Paint Removal Work:

1. Perform personal and area monitoring during the entire paint removal operation. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter of air at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air, work shall be stopped and the CIH shall immediately correct the condition(s) causing the increased levels and notify the Contracting Officer immediately.
2. The CIH shall review the sampling data collected on that day to determine if condition(s) requires any further change in work methods. Removal work shall resume when approval is given by the CIH. The Contractor shall control the lead level outside of the work boundary to less than 30 micrograms per cubic meter of air at all times. As a minimum, conduct area monitoring daily on each shift in which lead paint removal operations are performed in areas immediately adjacent to the lead control area.
3. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area. If adjacent areas are contaminated, clean and visually inspect contaminated areas. The CIH shall certify that the area has been cleaned of lead contamination.

3.3 LEAD-CONTAINING PAINT REMOVAL

- A. Remove paint within the areas designated on the drawings in order to completely expose the substrate. Take whatever precautions are necessary to minimize damage to the underlying substrate.
- B. Indoor Lead Paint Removal: Select paint removal processes to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste. This paint removal process should be described in the lead-containing paint removal plan. Perform manual sanding and scraping to the maximum extent feasible.
- C. Mechanical Paint Removal and Blast Cleaning: Perform mechanical paint removal and blast cleaning in lead control areas using negative pressure full containments with HEPA filtered exhaust. Collect paint residue and spent grit (used abrasive) from blasting operations for disposal in accordance with EPA, state and local requirements.
- D. Outside Lead Paint Removal: Select removal processes to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste. This paint removal process should be described in the lead-containing paint removal plan. Perform manual sanding and scraping to the maximum extent feasible.

3.4 SURFACE PREPARATIONS

- A. Avoid flash rusting or other deterioration of the substrate. Provide surface preparations for painting in accordance with Section 09 91 00, PAINTING.

3.5 CLEANUP AND DISPOSAL

- A. Cleanup: Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner and wet mopping the area.
- B. Certification: The CIH shall certify in writing that the inside and outside the lead control area air monitoring samples are less than 30 micrograms per cubic meter of air, the respiratory protection for the employees was adequate, the work procedures were performed in accordance with 29 CFR 1926.62, and that there were no visible accumulations of lead-contaminated paint and dust on the worksite. Do not remove the lead control area or roped-off boundary and warning signs prior to the

Contracting Officer's receipt of the CIH's certification. Reclean areas showing dust or residual paint chips.

- C. Testing of Lead-Containing Paint Residue and Used Abrasive Where indicated or when directed by the Contracting Officer, test lead containing paint residue and used abrasive in accordance with 40 CFR 261 for hazardous waste.

D. Disposal:

1. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles.
2. Store removed paint, lead-contaminated clothing and equipment, and lead-contaminated dust and cleaning debris into U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date lead-contaminated wastes were first put into the drum. Obtain and complete the Uniform Hazardous Waste Manifest forms. Comply with land disposal restriction notification requirements as required by 40 CFR 268:
 - a. At least 14 days prior to delivery, notify the Contracting Officer who will arrange for job site inspection of the drums and manifests.
 - b. As necessary, make lot deliveries of hazardous wastes to ensure that drums do not remain on the jobsite longer than 90 calendar days from the date affixed to each drum.
 - c. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing which may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62. Dispose of lead-contaminated waste material at a EPA and state approved hazardous waste treatment, storage, or disposal facility off Government property.
 - d. Store waste materials in U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. The Contracting Officer or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.
 - e. Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40

CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

- E. Disposal Documentation Submit written evidence that the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and state or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

Lead-Based Paint Surfaces/Components
Hines VA, Building 1 Library (Learning Center Project)

Room/ Location	Component	Substrate	Color	Test Results
Conference Room #1	Window Apron	Wood	Off White	Positive
Pipe Chase By Conference Room 1	All Walls	Plaster	Mustard	Positive
	Ceiling	Plaster	Mustard	Positive
	Door Frame	Metal	Off White	Positive
Pipe Chase #2	All Walls	Plaster	Mustard	Positive
Library	North, & West Walls	Plaster	Off White	Positive
	Window Frame	Wood	Off White	Positive
	Window Apron	Wood	Off White	Positive
Storage Room	All Walls	Plaster	Off White	Positive
	Window Sill	Wood	Off White	Positive
Work Room G-100-D-1	East Wall	Plaster	Gray	Positive
	Window Sill	Wood	Gray	Positive
	Window Frame	Wood	Gray	Positive
	Window Apron	Wood	Gray	Positive
Room G-101-A-9	Window Sill	Wood	Gray	Positive
	Window Apron	Wood	Gray	Positive
Room G-100-F	Window Lintel	Concrete	Tan	Positive
Library West Elevation Exterior Window Lintel	Exterior Window Lintel	Concrete	Tan	Positive
Library East Elevation Exterior Window Lintel	Exterior Window Lintel	Concrete	Tan	Positive

- - - E N D - - -

SECTION 02 85 00
MICROBIAL REMEDIATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Work under this section is subject to the requirements of the Contract Documents.
- B. Description of Work: Contractor shall perform mold remediation throughout all buildings. Contractor is responsible for conducting a visual survey of all buildings and identifying mold contaminated areas, and completing remediation activities in accordance with all applicable local, state and federal guidelines. Quantities and location provided in Table 1 and drawings, are for general information.
- C. Furnish all materials, labor services, tools, and equipment necessary to perform remediation work specified herein, including but not limited to the following:
1. Isolation of mold abatement areas, protection of adjacent areas, construction of containment where needed, cleanup and decontamination to ambient levels, proper packaging and disposal of wastes.
 2. Compliance with all applicable laws, regulations, standards and these specifications. In the case of a conflict, the contractor will comply with the most stringent.
 3. Contractor is required to maintain and show proof of all licenses, accreditations, permits, fees, notifications, reports, or other documents required by law, regulation, this specification or the Documents. All remediation workers should have received Mold Awareness Training.
 4. Governing Laws, Regulations and Standards: Microbial remediation work occurring in interior building spaces are not currently covered by any state, local or federal authority. However, the work under this specification will follow "EPA Guidelines for Mold Remediation in Schools and Commercial Buildings." This specification will cover the remediation of microbial-contaminated areas. The Contractor shall perform this work in accordance with all applicable regulations including, but not limited to the Illinois Environmental Protection Agency (IEPA), U.S. EPA, U.S. Department of Transportation, and Occupational Safety and Health Agency (OSHA).
 5. Suspect microbial contaminations, including mold and fungi, were visually identified throughout the buildings. This includes concrete, drywalls, plasters, cinder blocks and bricks; wood and other materials.
 6. The VA will provide an Environmental Consultant who will oversee the mold remediation work to determine if applicable local, state and federal requirements and specifications are being followed by remediation contractor. The Environmental Consultant will conduct all required clearance inspection/testing in accordance with the requirements of this specification.

1.02 DEFINITIONS

- A. Allergen: Substance (such as mold) that can cause an allergic reaction.
- B. APR: Air purifying respirator
- C. AHU: air handling unit providing ventilation, heating, and air-conditioning for the building and/or area.
- D. Biocide: Substance or chemical that kills organisms such as molds.
- E. Certified Industrial Hygienist (CIH): As used in this section, refers to an Industrial Hygienist employed by the Contractor and is certified by the American Board of Industrial Hygiene in comprehensive practice.
- F. VA Environmental Consultant: means the entity provided by the VA to oversee the Mold remediation activities and to determine that all applicable local, state and federal regulations are followed. The Contractor shall coordinate all remediation activities with the VA Environmental Consultant.
- G. Containment: physical barrier that isolate remediation area where the removal of microbial contamination occurs.
- H. Controlled Area: area which has been demarcated by containment and has restricted access to authorized remediation personnel.
- I. EPA: Environmental Protection Agency
- J. Fungi: include molds, yeasts, mushrooms, and puffballs. Molds reproduce by making spores. Mold spores waft through the indoor and outdoor air continually. Molds can grow on virtually any organic substance, providing moisture and oxygen are present. It is estimated that more than 1.5 million species of fungi exist.
- K. Fungicide: Substance or chemical that kills fungi.
- L. HEPA: High-Efficiency Particulate Air
- M. HEPA Filter: is a high efficiency particulate air filter capable of trapping and retaining 99.97 percent of all particulate larger than 0.3 microns.
- N. Microbial-Contaminated materials: means the construction, finish or other materials that contain fungal growth visible to the naked eye and materials that by virtue of their proximity to visibly-contaminated materials are identified by the Environmental Consultant as having the potential to become contaminated.
- O. Mil: is an abbreviation for millimeters.
- P. Mold: Molds are a group of organisms that belong to the kingdom Fungi. There are over 20,000 species of mold.
- Q. mVOC: Microbial volatile organic compound, a chemical made by a mold which may have a moldy or musty odor

- R. Negative Air Machine: is a portable air filtration device which when equipped with a HEPA grade air filter is capable of filtering 1500 to 2000 cubic feet of air per minute (cfm).
- S. Personal Protective Equipment (PPE): means the protective suits, head and foot covers, gloves, respirators and other items used to protect persons from health hazards.
- T. OSHA: Occupational Safety and Health Administration
- U. Sensitization: Repeated or single exposure to an allergen that results in the exposed individual becoming hypersensitive to the allergen.
- V. Spore: Molds reproduce by means of spores. Spores are microscopic; they vary in shape and size (2-100 micrometers).

1.03 SUBMITTALS

- A. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1910.1200.
- B. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes. Provide a copy of Mold Awareness Training certificate for all supervisors and workers in accordance with OSHA's Hazard Communication standard (29 CFR 1910.1200).
- C. Contractor's written respiratory protection program in accordance with OSHA 29 CFR 1910.134. The program shall include, but not be limited to, medical screening, semi-annual fit testing, training, cleaning and maintenance.
- D. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.
- E. Safety and Health Compliance: In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, state, and local authorities regarding removing, handling, storing, transporting, and disposing of waste materials.
- F. Remediation Plan and Schedule: Submit remediation plans for approval by the VA prior to starting any remediation work.
- G. Manufacturer's Catalog Data for vacuum filters and respirators including applicable material safety data sheets.
- H. Name and location of disposal facility. The contractor shall provide a letter from the disposal facility that they accept mold contaminated construction debris.
- I. Waste disposal receipts from the approved disposal facility. The receipts should be provided within five (5) working days after removing the waste from the site.

1.04 QUALITY CONTROL AND ASSURANCE

- A. The Environmental Consultant will also be responsible for the following:
1. Enforce contract specifications.
 2. Inspect and approve containment, barriers and decontamination systems.
 3. Observe activities at all times during the course of remediation, review work progress, and solve problems or adjust procedures as applicable.
 4. Perform all workplace inspections and clearance inspections.
 5. Report on abatement activities to the Construction Manager.
 6. Stop any work activities not performed in accordance with contract specifications. Violations shall be reported to the Construction Manager with a description of the activity, reasons for stoppage, and possible means for correcting problems.
 7. Maintain a daily log of on-site observations concerning contractor's compliance with activities required under this specification.
 8. Prepare a final comprehensive report consisting of daily logs and observations, remediation related documents submitted by the Contractor, and waste manifests.

PART 2 - PRODUCTS

2.01 TOOLS AND EQUIPMENT:

- A. All tools and equipment shall conform to minimum industry standards, and should include, at a minimum, the followings:
1. Negative air machines shall provide HEPA filtration and conform to ANSI Z9.2 fabrication criteria.
 2. Respirators shall be NIOSH approved for use with microbial contaminants such as those anticipated in the work.
 3. Contractor is responsible for complying with OSHA rules for other safety equipment such as hard hats, eye protection, gloves, footwear and any other safety devices used on the site.

2.02 MATERIALS

- B. Abatement materials:
1. Poly sheeting for all applications shall be 6 mil nominal thicknesses.
 2. Tape shall be 2" or 3" duct tape or other waterproof tape suitable for joining poly seams and attaching poly sheeting to surfaces.
 3. Spray adhesives shall be non-flammable and free of methylene chloride solvents.
 4. Disposal bags shall be 6 mil.
 5. Disposable suits, hoods, and foot coverings shall be TYVEK or similar.
 6. Solvents shall be compatible with any primers, mastics, adhesives, paints, coatings or other surfacing materials to be installed following their use.

PART 3 - EXECUTION

3.01 EMPLOYEE TRAINING, QUALIFICATIONS AND MEDICAL SCREENING

Supervisors and Workers shall receive Mold Awareness Training under OSHA's Hazard Communication standard (29 CFR 1910.1200) and be familiar with microbial remediation practices. Workers shall be trained in the use and limitations of respirators in accordance with OSHA's Respiratory Protection Standard (29 CFR 1910.134) and in the use of any additional protective clothing in accordance with OSHA's Protective Equipment standard (29 CFR 1910.132 and 20CFR 1910.133).

3.02 PERSONAL PROTECTIVE EQUIPMENT

- A. Respiratory Protection: Respiratory protection shall be worn by all persons potentially exposed to airborne microbial spores from the start of the remediation project until all areas have been thoroughly cleaned.
- B. Respiratory protection will include half-face piece or full-face piece National Institute for Occupational Safety and Health (NIOSH) approved respirators with High Efficiency Particulate Air (HEPA) filters capable of filtering dust, mist, fume and radionuclides.
- C. Respiratory shall not be removed while in the work area.
- D. Protective Clothing: Chemical splash goggles shall be provided when half-face piece respirators are used. Protective clothing shall include impermeable coveralls and gloves and boots.

3.03 HYGIENE PRACTICES

- A. Eating, drinking, smoking, chewing gum or tobacco, and applying of cosmetics are not allowed in the work area.
- B. All persons entering the work area are required to wear appropriate PPE and follow the entry and exit procedures.

3.04 PROHIBITED ACTIVITIES

- A. Conducting remediation when the building is occupied.
- B. Only disinfecting microbial-damaged materials; fungi remain allergenic and toxigenic in a non-viable state.

3.05 WORK AREA ISOLATION AND PREPARATION

- A. General Preparation: Contractor shall provide the followings:
 - 1. Warning signs at every entrance to the building and at all internal doorways to the work area.
 - 2. Entry and Exit Log

3. List of telephone numbers for:
 - a. local hospital and/or local emergency squad
 - b. VA's security office (if applicable)
 - c. owner representative reachable 24 hours per day
 - d. contractor's headquarters
 - e. architects or consultants directly involved in the project
- B. Secure the work area from entry by unauthorized persons.
- C. Separate Work Areas:
 1. Seal off all doorways and corridors that will not be used for passage during work.
 2. Install Illinois Department of Public Health (IDPH) "Type A" barriers in all openings larger than 4' x 8', consisting of wood or metal framing, a sheathing material such as plywood or drywall at least 5/8" thick on the work side, and double-layer- 6-mil polyethylene sheeting on both sides. Edges shall be caulked at the floor, ceiling, walls and fixtures to form an air-tight seal.
- D. Preparation:
 1. Shut down and lock out electric power to all work areas. Provide temporary power from an outside source with ground-fault circuit interrupter (GFCI) at the source.
 2. Shut down and isolate heating, cooling and ventilation systems.
 3. Clean all moveable non-porous, uncontaminated contents with a HEPA-filtered vacuum cleaner after barriers are in place. Remove these items from the room before starting the removal of microbial-contaminated materials
 4. Seal off all windows, corridors, doorways, ducts, grilles, diffusers, and other penetrations or openings with 6-mil poly and tape.
 5. Cover floors with two layers of 6-mil poly with seams staggered and taped and extending 12" up walls. Cover walls with one layers of 6-mil poly with each wall poly overlapping each floor's poly layers by 12". Cover ceiling with one layer of 4-mil poly. For mold contamination of less than of 100 sq feet, a mini-tent of one layer of poly can be made with two layers of poly on the floors. Work areas shall be kept under negative pressure using negative air machine(s). The air from the negative air machines shall be exhausted outside the building.
 6. Maintain emergency and fire exits.
 7. Once operational, the system shall be inspected daily with smoke tubes. Damages and defects will be repaired immediately upon discovery.

3.06 ABATEMENT PROCEDURES

- A. Limit the use of any aqueous materials during remediation (investigate use of micro-cloths, etc). If necessary, ensure that drying time is minimized to prevent further microbial growth.
- B. Stop all work if there is a break in the containment barriers. Repair the barrier and alert the attending environmental consultant.
- C. Wallboard (dry-wall, gypsum board) and other porous materials: Remove the drywall or other porous materials to at least 4 feet from ground or closest seam. Double wrap or double-bag all demolished and removed materials in 6-mil poly sheeting or 6-mil poly bags. Seal bags or wrapping securely and HEPA vacuum before removing bags from site. Clean all surfaces in the rooms thoroughly, including fixed items not removed, with a HEPA-filtered vacuum.
- D. Concrete, Plaster, Metal, Cinder Block, Bricks, and Wood: Wet vacuum all surfaces in the work area thoroughly, including fixed items not removed, with a HEPA-filtered vacuum. Use a brush attachment on the vacuum cleaner when cleaning semi-porous or hard surfaces, such as concrete, to dislodge spores that may be trapped in surfaces pores. If vacuum cleaning does not remove dusts adequately; consider wiping surfaces with a slightly damp cloth or specially treated micro-cloth. Use detergent solution (or cleaners like Fiberlock Shockwave) and scrub as necessary to clean the moldy area. Mold resistant transparent (low viscosity) coating may be applied on the cleaned surface to prevent new fungal growth. No coating shall be applied without getting approval from the VA project architect.

3.07 CLEANING AND DECONTAMINATION

- A. All visible accumulations of microbial contamination, debris, tools and unnecessary equipment shall be removed from the work area.
- B. Vacuum and wipe when necessary all surfaces within containment.
- C. Remove all remaining tools, cleaning materials and waste from the work area.

3.08 FINAL CLEARANCE

- A. The VA Environmental Consultant will visually inspect the area and may collect air samples to confirm the completion of mold remediation.
- B. If clearance inspection or testing fails as per the environmental consultant, the abatement contractor is responsible for repeating the cleaning process as necessary until final clearance inspection / tests are successful.

3.09 WASTE DISPOSAL AND EQUIPMENT LOAD-OUT

- A. All microbial-contaminated waste shall be placed in sealed double 6 mil poly bags with gooseneck seals. Every effort shall be made to maintain the integrity of the bags until the waste is released for disposal.
- B. Dispose of contaminated materials in a landfill authorized to receive mold construction debris. Bags must not be opened and must be buried in a landfill; do not deliver to waste recycling facilities where unauthorized opening of bags may occur.
- C. Equipment can be decontaminated with simple biocides or tri-sodium phosphate.

3.10 DEMOBILIZATION

- A. Once the final inspection / clearance sample results are accepted, containment can be removed, HVAC systems restored and fixtures returned.
- B. A walk-through punch list shall be completed by the VA Environmental Consultant once area has been cleared.

Suspect Mold Growth Areas Library Learning Center Project

Suspect Mold Growth Areas	
Description	Estimated Quantity
Mold under carpet flooring	300 sq ft

Note: The mold inspection was based on visible observations. Quantities are for informational purpose only. Contractor must verify quantities and locations.

- - - END - - -

SECTION 02 86 00
FLUORESCENT AND HIGH INTENSITY DISCHARGE
LIGHTS AND UNIVERSAL WASTE REMOVAL

PART 1 - GENERAL

- 1.1 INTRODUCTION: On June 20, 1996, the Illinois General Assembly adopted the Universal Waste Rule R 95-20) and codified it as 35 Ill. Adm. Code 733. On August 19, 1997, Governor Edger signed House Bill 2164 (Public Act 90-502) which designated high intensity discharge lamps and fluorescent lamps (mercury-containing lamps) as a category of universal waste because, when spent, they exhibit the characteristic of toxicity as determined by the toxicity characteristic leaching procedure (TCLP). Since toxicity is one of the characteristics of a hazardous waste, the spent lamps are, therefore, hazardous waste. On October 17, 1997, the Illinois Environmental Protection Agency submitted Proposed Amended Regulations, Motion for Acceptance and Statement of Reasons to The Illinois Pollution Control Board to include high intensity discharge lamps and fluorescent lamps as a universal waste and to approve procedures for the management of used mercury containing lamps.
- 1.2 DEFINITIONS: In addition to the terms listed below, all definitions in the laws and regulations listed in Section 1.5 are incorporated by reference, whether or not restated herein.
- A. Certified Industrial Hygienist (CIH): As used in this section, refers to an Industrial Hygienist employed by the Contractor and is certified by the American Board of Industrial Hygiene in comprehensive practice.
 - B. VA Environmental Consultant: means the entity provided by the VA to oversee the lead removal activities and to determine that all applicable local, state and federal regulations are followed. The Contractor shall coordinate all abatement activities with the VA Environmental Consultant.
 - C. CFR: means the Code of Federal Regulation, which is the basic component of the Federal Register publication system. The CFR is a codification of the regulations of the various Federal Agencies.
 - D. Competent Person: One who is capable of identifying existing hazards in the workplace and who has the authority to take prompt corrective measures to eliminate them, as specified in OSHA (29 CFR 1926.1101).
 - E. Generator - Means any person, by site, whose act or process produces hazardous waste Identified or listed in 35 Ill. Adm. Code 721 or whose act first causes a hazardous waste to become subject to regulation.
 - F. Hazardous Waste - Hazardous Waste means any wastes that pose a substantial danger immediately or over a period of time to human, plant, or animal life. A waste is classified as hazardous if it exhibits any of the following characteristics: 1) ignitability, 2) corrosivity, 3) reactivity, or 4) toxicity, and as defined in Section 721.103 of Title 35, IEPA.
 - G. Manifest: means the form provided or prescribed by IEPA and used for identifying name, quality, routing, and destination of special waste during its transportation from point of generation to the point of disposal, treatment, or storage.

- H. Mercury-Containing Lamp - an electric lamp into which mercury is purposely introduced by the manufacturer for the operation of the lamp. Mercury-containing lamps include, but are not limited to, fluorescent lamps and high intensity discharge lamps.
- I. PCB: any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contains such substance.
- J. PCB Item: any PCB Article, PCB Article Container, PCB Container, or PCB Equipment, that deliberately or unintentionally contains or has a part of it as PCB.
- K. Personnel Monitoring: Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1910.1025. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 150mm to 225 mm (6 to 9 inches) and the center at the nose or mouth of an employee.
- L. Special Waste - Special Waste means any industrial process waste, pollution control waste, except as may be determined pursuant to Section 22.9 of the IEPA.
- M. Transporter: any person engaged in the off-site transportation of special waste and/or hazardous waste within the United States, by air, rail, highway or water, is such transportation requires a manifest under 40 CFR Part 262.
- N. Small Quantity Handler of Universal Waste - means a universal waste handler that does not accumulate more than 5,000 kilograms total of universal waste at any time (one year period).
- O. Universal Waste - means any hazardous wastes that are subject to the universal waste requirements of 35 Ill. Adm. Code 733 and which includes batteries, thermostats, and mercury-containing lamps as defined in Section 733.102, 733.103, 733.104, and 733.107 of 35 Ill. Adm. Code 733.
- P. Universal Waste Generator - means any person, by site, whose act or process produces hazardous waste identified or listed in Ill. Adm. Code 721 or whose act first causes a hazardous waste to become subject to regulation.
- Q. Work Area means the area or areas where mercury containing lamps are removed or being stored.

1.3 SCOPE OF WORK.

- A. Refer to Table 1 at the end of the specifications.

1.4 WORK INCLUDED

- A. The work includes all labor, equipment, materials, and supplies and all else necessary to perform the Scope of Work in the Documents by the procedures described herein. The contractor, by submitting a bid for the work, represents itself as knowledgeable and expert in the performance of the work, and includes all things usually and customarily necessary to provide a complete and finished job, whether specifically mentioned or not.

- B. Removal of mercury-containing lamps listed in the Documents, including isolating the work areas, protection of adjacent areas, cleanup, proper packaging and recycling of wastes, and all other steps necessary to complete the scope of work.
- C. Replacement of damaged surfaces, fixtures, or furnishings to restore them to their pre-existing condition to the satisfaction of the Architect Project Manager.
- D. When the Documents include lead and asbestos abatement items in the same spaces, typically Mercury-containing lamp removal will be performed first.
- E. Mercury-containing lamps may not be disposed of as normal construction waste, but must instead be recycled.
- F. Compliance with all applicable laws, regulations, standards, and these specifications. In the case of a conflict, the contractor will comply with the most stringent.
- G. All licenses, accreditations, permits, fees, notifications, reports, or other documents required by law, regulation, this specification, or the Documents.

1.5 LAWS, REGULATIONS AND STANDARDS:

- A. The following laws, regulations, and standards are incorporated by reference:
 - 1. 40 CFR 273 Universal Waste Rule
 - 2. 35 Ill. Adm. Code 720 Hazardous Waste Management Systems General
 - 3. 35 Ill. Adm. Code 721 Identification & listing of Hazardous Waste
 - 4. 35 Ill. Adm. Code 722 Standards Applicable to Generators of Hazardous Waste
 - 5. 35 Ill. Adm. Code 723 Standards Applicable to Transporters of Hazardous Waste
 - 6. 35 Ill. Adm. Code 724 Standards Applicable to Owners, Treaters Storers, and Disposers of Hazardous Waste
 - 7. 35 Ill. Adm. Code 725 Interim Status Standards of Hazardous Waste Treaters, Storers, and Disposers
 - 8. 35 Ill. Adm. Code 728 Land Disposal Restrictions
 - 9. 35 Ill. Adm. Code 733 Universal Waste Management
 - 10. 29 CFR 1910.134 OSHA Respiratory Protection
 - 11. 29 CFR 1926 OSHA Construction Standards
 - 12. 49 CFR 171 thru 180 USDOT Hazardous Materials
 - 13. 40 CFR 761.60(b)(2) US EPA PCBs Regulations

1.6 MONITORING:

- A. The VA will provide Environmental Consultant who will oversee the abatement work to determine if applicable local, state and federal requirements and abatement procedures are being followed by the abatement contractor. The Environmental Consultant will collect all required clearance samples in accordance with the requirements of this specification. The EC will provide project monitoring independent from the contractor, as follows:
- B. Prior to the start of the work:
 - 1. Confirm the locations and amounts of fluorescent lights and assume that they are mercury-containing lamps,

C. During the work:

1. Observe the work periodically for compliance with project specifications.
2. The EC may stop the work if mercury containing lamps are not being removed, packaged, labeled, and stored properly. Contractor will be responsible for taking corrective action to prevent recurrence, collecting broken lamps in packaging which will prevent release of lamp fragments and residues, cleaning areas that become visibly contaminated due to lamp breakage due to improper handling of lamps, and undertake hazardous waste determination in accordance with 35 Ill Adm. Code 721, Subpart C.
3. If the lamp material, residue, debris or other solid waste is determined to be not hazardous, contractor may manage the waste as general construction debris.

D. Upon completion of the work:

1. Visually inspect work area for visible lamp debris. Contractor shall be required to re-clean the area or portions of areas until no visible lamp debris remains.
2. The EC will confirm and document that proper removal; storage, labeling, and cleanup of broken lamps were followed.

1.7 SUBMITTALS BY THE CONTRACTOR:

- A. Evidence that all contractor employees in the work areas are trained in accordance with OSHA and specification requirements:
 1. Proof of mercury-containing lamp removal and abatement training, as specified in Paragraph 3.1 of this document.
- B. Remediation Schedule - submit remediation schedules for approval by the VA at the pre-construction meeting.
- C. Remediation Plan - Submit remediation plans for approval by the VA at the pre-construction meeting.
- D. Hazard communication program; Establish and implement a Hazard Communication Program as required by 29CFR 1910.1200
- E. Hazardous Waste Management plan. The plan shall comply with the applicable requirements of federal, state, and local hazardous waste regulations.
- F. Waste Shipment Records/Receipts

PART 2 - PRODUCTS

2.1 TOOLS AND EQUIPMENT: All equipment shall at least conform to minimum industry standards. Contractor is fully responsible for complying with OSHA Rules relative to safety equipment usage.

A. Equipment:

1. All safety equipment, such as hard hats, eye protection, gloves, and footwear shall comply with their respective OSHA and/or ANSI standards.

B. Tools: Mercury Spill Cleanup Kit, HEPA Vacuum

2.2 MATERIALS

- A. Newly installed lamps which become a part of the work shall be of good quality, and low mercury containing, and conform to the respective reinstallation specification sections.
- B. Removal/Abatement Materials:
 - 1. Poly sheeting (as drop cloths) for all applications shall be 6-mil nominal thickness.
 - 2. Lamp storage containers (Corrugated sleeved) or as recommended and provided by the manufacturer.
 - 3. Protective eye ware, non-slip gloves.

PART 3 - EXECUTION

3.1 EMPLOYEE TRAINING, QUALIFICATION, AND MEDICAL SCREENING

- A. Supervisors and Workers shall have successfully completed training in mercury-containing lamp removal and storage. This training shall be conducted by a Certified Industrial Hygienist or other professional knowledgeable in the potential hazards and safe removal of mercury-containing lamps, and include, at a minimum, the following:
 - 1. Potential risks, and health effects of Mercury.
 - 2. Engineering and administrative controls.
 - 3. Work practices, including safe removal, packaging, storing and labeling methods, and cleanup.
 - 4. PPE usage, including protective eye ware, gloves.
 - 5. Waste packaging, handling, and recycling.
 - 6. Specification requirements.
- B. Medical Screening. No special medical screening is necessary.

3.2 RESPIRATORY PROTECTION

- A. Respirators are not required when handling unbroken lamps.

3.3 HYGIENE PRACTICES

- A. Eating, drinking, smoking, chewing gum or tobacco, and applying of cosmetics are not allowed in the work area.
- B. Personal protective equipment (PPE) shall be worn throughout mercury-containing lamp removal, packaging, labeling, and debris cleanup procedures. All persons entering the work area shall wear appropriate PPE, and shall follow established work area entry and exit procedures.
- C. Personal protection equipment shall include:
 - 1. Protective eye ware.
 - 2. Gloves.
 - 3. Hard hats.
- D. Authorized visitors shall be provided with suitable PPE as required in the work area.

3.4 PROHIBITED ACTIVITIES

- A. Storing lamps without providing proper containers.

- B. Storing lamps without proper labels.
- C. Intentionally braking or crushing lamps.
- D. Disposing of unbroken or broken lamps.

3.5 WORK AREA ISOLATION AND PREPARATION

- A. General Preparation:
 - 1. Post warning signs at entrances to the work area. Wording shall be at least two inches high stating, Warning. Unauthorized Entry Prohibited.
 - 2. Secure the work area from entry by unauthorized persons.
- B. Interior Preparation:
 - 1. Objects in the removal area shall be protected with 6 mil poly sheeting
 - 2. Unauthorized entry shall be prevented by using appropriate barriers, such as warning tape, or other suitable barriers.
 - 3. Turn off electrical circuits in the work area as much as possible.

3.6 ABATEMENT PROCEDURES

- A. Remove lights from lighting fixture so as to avoid accidental breakage.
- B. Place unbroken lamps in sleeved recycling container.
- C. Label the outside of the container with the date the lamps were taken out of service.
- D. Store containers containing lamps in a secure area so as to avoid accidental breakage.
- E. Appropriate OSHA protection shall be provided, as needed. The Contractor is responsible for compliance with all applicable OSHA regulations and guidelines.

3.7 CLEANING AND DECONTAMINATION

- A. Use Mercury spill cleanup kit and HEPA vacuum as necessary when cleaning up broken lamp debris.
- B. All visible accumulations of debris shall be removed from the work area.
- C. Protective poly shall be folded in on itself, rolled up, and placed in 6-mil bags for recycling.
- D. Work area surfaces shall be visibly free of all mercury-containing lamp debris.

3.8 FINAL CLEARANCE:

- A. Cleaning may be discontinued when no visible debris is present, and upon completion and verification of proper cleaning and debris containerization.

3.9 WASTE RECYCLING AND EQUIPMENT LOAD-OUT

- A. Packaging Waste:
 - 1. All mercury-containing lamp debris, including unbroken and broken mercury containing lamps, and other potentially contaminated items shall be properly packaged for recycling.

2. Use 6-mil plastic bags with goose-neck seal, or other impermeable containers.
 3. Wrap large or irregular items in 6-mil poly sheeting and seal with tape.
 4. Sharp, jagged, or other items that may puncture poly shall be packaged in rigid impermeable containers such as drums or boxes, or wrapped in burlap or other protective covering before sealing in bags or poly sheeting.
 5. Label containers with one of the following phrases: Universal Waste-Containing Lamp(s) or Waste- Mercury-Containing Lamp(s) or Used Mercury-Containing-Lamp(s).
 6. Label containers with the earliest date that the mercury containing lamps became a waste
- B. Removing Items from Work Area:
1. All containers containing mercury-containing lamps must be properly containerized labeled and stored for subsequent recycling.
 2. Mercury-containing lamps may not be accumulated for more than six months from the date the universal waste is generated (date lamps were taken out of service).
- C. Storage of Containerized Mercury-Containing Lamps:
1. All mercury-containing lamps shall be in packaging which will minimize breakage during normal handling and storage. The secured container shall be properly labeled and kept in an accumulation area that is isolated from other waste materials at all times to prevent unauthorized disposal.
 2. An on-site inventory of all mercury containing lamps, either taken out of service or broken, must be maintained identifying the date that each mercury containing lamp or containerized group of mercury containing lamps were taken out of service and became a waste.
- D. Shipment of Items from Project:
1. Mercury-containing lamps or debris may be not disposed of as normal construction and demolition debris.
 2. Mercury-containing lamps or debris may only be recycled.
 3. Mercury containing lamps may not be transported to a place other than another universal waste handler, a destination facility, or a foreign destination.
 4. If a mercury-containing lamp handler transports lamps off-site, the handler becomes a universal waste transporter and shall comply with the transporter requirements USDOT regulations under 40 CFR 172 through 180.
 5. Prior to shipping mercury containing lamps to another universal waste handler, the originating handler must ensure that the receiving handler agrees to accept the shipment.

**Summary of PCB's and Universal Waste
Hines VA, Building 1 Library (Learning Center Project)**

Universal Waste	
Description	Estimated Quantity
Light Tubes and Vapor Lighting	650
Ballasts	310

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SECTION 03 30 53
(SHORT-FORM) CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies cast-in-place structural concrete and material 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 TOLERANCES:

- A. ACI 117.
- B. Slab Finishes: ACI 117, F-number method in accordance with ASTM E1155.

1.4 REGULATORY REQUIREMENTS:

- A. ACI SP-66 ACI Detailing Manual
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Concrete Mix Design.
- C. Shop Drawings: Reinforcing steel: Complete shop drawings.
- D. Manufacturer's Certificates: Air-entraining admixture, chemical admixtures, curing compounds.

1.6 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
 - 117R-06.....Tolerances for Concrete Construction and Materials
 - 211.1-91(R2002).....Proportions for Normal, Heavyweight, and Mass Concrete
 - 301-05.....Specification for Structural Concrete
 - 305R-06.....Hot Weather Concreting
 - 306R-2002.....Cold Weather Concreting
 - SP-66-04ACI Detailing Manual
 - 318/318R-05.....Building Code Requirements for Reinforced Concrete
 - 347R-04.....Guide to Formwork for Concrete

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

A185-07.....	Steel Welded Wire, Fabric, Plain for Concrete Reinforcement
A615/A615M-08.....	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A996/A996M-06.....	Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
C31/C31M-08.....	Making and Curing Concrete Test Specimens in the Field
C33-07.....	Concrete Aggregates
C39/C39M-05.....	Compressive Strength of Cylindrical Concrete Specimens
C94/C94M-07.....	Ready-Mixed Concrete
C143/C143M-05.....	Standard Test Method for Slump of Hydraulic Cement Concrete
C150-07.....	Portland Cement
C171-07.....	Sheet Material for Curing Concrete
C172-07.....	Sampling Freshly Mixed Concrete
C173-07.	Air Content of Freshly Mixed Concrete by the Volumetric Method
C192/C192M-07.....	Making and Curing Concrete Test Specimens in the Laboratory
C231-08.....	Air Content of Freshly Mixed Concrete by the Pressure Method
C260-06.....	Air-Entraining Admixtures for Concrete
C494/C494M-08.....	Chemical Admixtures for Concrete
C618-08.....	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
D1751-04.	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
D4397-02.....	Polyethylene Sheeting for Construction, Industrial and Agricultural Applications
E1155-96(2008).....	Determining F_F Floor Flatness and F_L Floor Levelness Numbers

PART 2 - PRODUCTS**2.1 FORMS:**

- A. Wood, plywood, metal, or other materials, approved by Resident Engineer, of grade or type suitable to obtain type of finish specified.

2.2 MATERIALS:

- A. Portland Cement: ASTM C150, Type I or II.
- B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalis, and loss on ignition (LOI) not to exceed 5 percent.
- C. Coarse Aggregate: ASTM C33, Size 67. Size 467 may be used for footings and walls over 300 mm (12 inches) thick. Coarse aggregate for applied topping and metal pan stair fill shall be Size 7.
- D. Fine Aggregate: ASTM C33.
- E. Mixing Water: Fresh, clean, and potable.
- F. Air-Entraining Admixture: ASTM C260.
- G. Chemical Admixtures: ASTM C494.
- H. Vapor Barrier: ASTM D4397, 0.25 mm (10 mil).
- I. Reinforcing Steel: ASTM A615 or ASTM A996, deformed. See structural drawings for grade.
- J. Welded Wire Fabric: ASTM A185.
- K. Expansion Joint Filler: As specified in Section 07 91 26, PREFORMED JOINT FILLERS.
- L. Sheet Materials for Curing Concrete: ASTM C171.
- M. Abrasive Aggregates: Aluminum oxide grains or emery grits.
- N. Liquid Densifier/Sealer: 100 percent active colorless aqueous silicate solution.
- O. Grout, Non-Shrinking: Premixed ferrous or non-ferrous, mixed and applied in accordance with manufacturer's recommendations. Grout shall show no settlement or vertical drying shrinkage at 3 days or thereafter based on initial measurement made at time of placement, and produce a compressive strength of at least 18mpa (2500 psi) at 3 days and 35mpa (5000 psi) at 28 days.

2.3 CONCRETE MIXES:

- A. Design of concrete mixes using materials specified shall be the responsibility of the Contractor as set forth under Option C of ASTM C94.
- B. Compressive strength at 28 days shall be not less than 30 Mpa (4000 psi).
- C. Establish strength of concrete by testing prior to beginning concreting operation. Test consists of average of three cylinders made and cured in accordance with ASTM C192 and tested in accordance with ASTM C39.
- D. Maximum slump for vibrated concrete is 100 mm (4 inches) tested in accordance with ASTM C143.

E. Cement and water factor (See Table I):

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete: Strength	Non-Air-Entrained		Air-Entrained	
Min. 28 Day Comp. 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. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.

* Determined by Laboratory in accordance with ACI 211.1 for normal concrete.

F. Air-entrainment is required for all exterior concrete. Air content shall conform with the following:

**TABLE I - TOTAL AIR CONTENT
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)**

Nominal Maximum Size of Coarse Aggregate	Total Air Content Percentage by Volume
10 mm (3/8 in)	6 to 10
13 mm (1/2 in)	5 to 9
19 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

2.4 BATCHING & MIXING:

A. Store, batch, and mix materials as specified in ASTM C94.

1. Job-Mixed: Concrete mixed at job site shall be mixed in a batch mixer in manner specified for stationary mixers in ASTM C94.

2. Ready-Mixed: Ready-mixed concrete comply with ASTM C94, except use of non-agitating equipment for transporting concrete to the site will not be permitted. With each load of concrete delivered to project, ready-mixed concrete producer shall furnish, in duplicate, certification as required by ASTM C94.

PART 3 - EXECUTION

3.1 FORMWORK:

- A. Installation conform to ACI 347. Sufficiently tight to hold concrete without leakage, sufficiently braced to withstand vibration of concrete, and to carry, without appreciable deflection, all dead and live loads to which they may be subjected.
- B. 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. Inserts, sleeves, and similar items: Flashing reglets, masonry ties, anchors, inserts, wires, hangers, sleeves, boxes for floor hinges and other items specified as furnished under this and other sections of specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned and built into construction, and maintained securely in place.
- D. Construction Tolerances:
 1. Contractor is responsible for setting and maintaining concrete formwork to assure erection of completed work within tolerances specified to accommodate installation or other rough and finish materials. Remedial work necessary for correcting excessive tolerances is the responsibility of the Contractor. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Government.
 2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

3.2 REINFORCEMENT:

- A. Details of concrete reinforcement, unless otherwise shown, in accordance with ACI 318 and ACI SP-66. Support and securely tie reinforcing steel to prevent displacement during placing of concrete.

3.3 VAPOR BARRIER:

- A. Except where membrane waterproofing is required, place interior concrete slabs on a continuous vapor barrier.
- B. Place 100 mm (4 inches) of fine granular fill over the vapor barrier to act as a blotter for concrete slab.
- C. Lap joints 150 mm (6 inches) and seal with a compatible pressure-sensitive tape.
- D. Patch punctures and tears.

3.4 PLACING CONCRETE:

- A. Remove water from excavations before concrete is placed. Remove hardened concrete, debris and other foreign materials from interior of forms, and from inside of mixing and conveying equipment. Obtain approval of Resident Engineer before placing concrete. Provide screeds at required elevations for concrete slabs.
- B. Before placing new concrete on or against concrete which has set, existing surfaces shall be roughened and cleaned free from all laitance, foreign matter, and loose particles.
- C. Convey concrete from mixer to final place of deposit by method which will prevent segregation or loss of ingredients. Do not deposit in work concrete that has attained its initial set or has contained its water or cement more than 1 1/2 hours. Do not allow concrete to drop freely more than 1500 mm (5 feet) in unexposed work nor more than 900 mm (3 feet) in exposed work. Place and consolidate concrete in horizontal layers not exceeding 300 mm (12 inches) in thickness. Consolidate concrete by spading, rodding, and mechanical vibrator. Do not secure vibrator to forms or reinforcement. Vibration shall be carried on continuously with placing of concrete.
- D. Hot weather placing of concrete: Follow recommendations of ACI 305R to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete.
- E. Cold weather placing of concrete: Follow recommendations of ACI 306R, to prevent freezing of thin sections less than 300 mm (12 inches) and to permit concrete to gain strength properly, except that use of calcium chloride shall not be permitted without written approval from Resident Engineer.

3.5 PROTECTION AND CURING:

- A. Protect exposed surfaces of concrete from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperature. Curing method shall be subject to approval by Resident Engineer.

3.6 FORM REMOVAL:

- A. Forms remain in place until concrete has a sufficient strength to carry its own weight and loads supported. Removal of forms at any time is the Contractor's sole responsibility.

3.7 SURFACE PREPARATION:

- A. Immediately after forms have been removed and work has been examined and approved by Resident Engineer, remove loose materials, and patch all stone pockets, surface honeycomb, or similar deficiencies with cement mortar made with 1 part portland cement and 2 to 3 parts sand.

3.8 FINISHES:

- A. Vertical and Overhead Surface Finishes:
1. Unfinished Areas: Vertical and overhead concrete surfaces exposed in unfinished areas, above suspended ceilings in manholes, and other unfinished areas exposed or concealed will not require additional finishing.
 2. Interior and Exterior Exposed Areas (to be painted): Fins, burrs and similar projections on surface shall be knocked off flush by mechanical means approved by Resident Engineer and rubbed lightly with a fine abrasive stone or hone. Use an ample amount of water during rubbing without working up a lather of mortar or changing texture of concrete.
 3. Interior and Exterior Exposed Areas (finished): Finished areas, unless otherwise shown, shall be given a grout finish of uniform color and shall have a smooth finish treated as follows:
 - a. After concrete has hardened and laitance, fins and burrs have been removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone or stone.
 - b. Apply grout composed of 1 part portland cement and 1 part clean, fine sand (smaller than 600 micro-m (No. 30) sieve). Work grout into surface of concrete with cork floats or fiber brushes until all pits and honeycomb are filled.
 - c. After grout has hardened, but still plastic, remove surplus grout with a sponge rubber float and by rubbing with clean burlap.

- d. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish for any area in same day. Confine limits of finished areas to natural breaks in wall surface. Do not leave grout on concrete surface overnight.

B. Slab Finishes:

1. Scratch Finish: Slab surfaces to receive a bonded applied cementitious application shall all be thoroughly raked or wire broomed after partial setting (within 2 hours after placing) to roughen surface to insure a permanent bond between base slab and applied cementitious materials.
2. Floating: Allow water brought to surface by float used for rough finishing to evaporate before surface is again floated or troweled. Do not sprinkle dry cement on surface to absorb water.
3. Float Finish: Ramps, stair treads, and platforms, both interior and exterior, equipment pads, and slabs to receive non-cementitious materials, except as specified, shall be screened and floated to a smooth dense finish. After first floating, while surface is still soft, surfaces shall be checked for alignment using a straightedge or template. Correct high spots by cutting down with a trowel or similar tool and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections on floated finish by rubbing or dry grinding. Refloat the slab to a uniform sandy texture.
4. Steel Trowel Finish: Applied toppings, concrete surfaces to receive resilient floor covering or carpet, future floor roof and all monolithic concrete floor slabs exposed in finished work and for which no other finish is shown or specified shall be steel troweled. Final steel troweling to secure a smooth, dense surface shall be delayed as long as possible, generally when the surface can no longer be dented with finger. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure on trowel to compact cement paste and form a dense, smooth surface. Finished surface shall be free of trowel marks, uniform in texture and appearance.
5. Broom Finish: Finish all exterior slabs, ramps, and stair treads with a bristle brush moistened with clear water after the surfaces have been floated.

6. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:

Slab on grade & Shored suspended slabs		Unshored suspended slabs	
Specified overall value	F_F 25/ F_L 20	Specified overall value	F_F 25
Minimum local value	F_F 17/ F_L 15	Minimum local value	F_F 17

3.9 SURFACE TREATMENTS:

- A. Surface treatments shall be mixed and applied in accordance with manufacturer's printed instructions.
- B. Liquid Densifier/Sealer: Use on all exposed concrete floors and concrete floors to receive carpeting except those specified to receive non-slip finish.
- C. Non-Slip Finish: Except where safety nosing and tread coverings are shown, apply non-slip abrasive aggregate to treads and platforms of all concrete steps and stairs, and to surfaces of exterior concrete ramps and platforms. Aggregate shall be broadcast uniformly over concrete surface. Trowel concrete surface to smooth dense finish. After curing, rub the treated surface with abrasive brick and water sufficiently to slightly expose abrasive aggregate.

3.10 APPLIED TOPPING:

- A. Separate concrete topping with thickness and strength shown with only enough water to insure a stiff, workable, plastic mix.
- B. Continuously place applied topping until entire section is complete, struck off with straightedge, compact by rolling or tamping, float and steel trowel to a hard smooth finish.

3.11 RESURFACING FLOORS:

- A. Remove existing flooring, in areas to receive resurfacing, to expose existing structural slab and to extend not less than 25 mm (1 inch) below new finished floor level. Prepare exposed structural slab surface by roughening, broom cleaning, wetting, and grouting. Apply topping as specified.

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SECTION 03 54 00
CEMENTITIOUS UNDERLAYMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies cementitious underlayments for patching and encapsulation of existing floor substrates. Cementitious underlayments include but are not limited to, following:

1. Portland cement based underlayment, non-structural.
2. Gypsum based underlayment, non-structural.
3. Portland cement based patching compound, non-structural.

1.2 RELATED WORK

A. Concrete topping of existing concrete floors and slabs.

1.3 PERFORMANCE REQUIREMENTS

1. Characteristics: Underlayment products shall provide a hard, dense, and impact and abrasion resistant surface.
2. Substrate Deflection: Deflection of substrate construction shall not exceed L/360 under maximum design loads.
3. Adhesion to Substrate: Failure of underlayment products to bond to substrate as evidenced by a hollow sound when tapped, premature wear through to substrate, and defects, cracks, delamination, disintegration, and other failure of products to perform as a substrate, including failure to meet performance criteria requirements of this Section, will be considered failure of materials and workmanship. Repair and replace underlayment in areas of such failures as directed by Architect.
4. Approval: Do not use underlayment and patching materials without prior written approval of manufacturer of finish material for application and compatibility.

1.4 QUALITY ASSURANCE

A. Product Qualifications: Provide products indicated under same category produced by a single manufacturer.

A1 B. Installer Qualifications: Installer shall specialize in performing work of this Section and have three (3) years minimum documented experience in detailing, installation and maintenance of type and quality required for work and shall be acceptable to manufacturer. Upon request, provide proof of qualifications.

- C. Project Site Mock-Up: Prior to beginning work, install mock-up at a location designated by Architect of 100 square feet minimum. Color, texture, installation procedure and finish is of prime importance. When reviewed and accepted by Architect, maintain same controls and procedures throughout work.
1. Mock-up which is acceptable to Architect shall be standard for appearance by which actual work will be judged.
 2. Acceptable mock-up may be part of the permanent work.
- D. Pre-Installation Meeting: Conduct a pre-installation meeting at project site prior to starting work at project site and delivery of products to review conditions associated with performing work. Meeting shall include review of construction conditions, substrate conditions, environmental requirements, ambient conditions, coordination required for installation of work and responsibility for temporary operation of permanent systems required for work. Meeting participants shall include Architect, representative of manufacturer, installer of work under this Section, installers of related work. Record discussions of meeting, and agreements and disagreements reached, and furnish a copy of record to each participant.
- E. Manufacturer Representative: Provide services of a trained technical representative of manufacturer to advise on work and to perform other like services at project site as necessary. As minimum, provide full-time attendance at start of installation and thereafter as required to provide a proper installation. Representative shall give preparation and installation instructions, examine substrates before installations and examine completed installation.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data: Submit product specifications, technical data, standard detail drawings and installation instructions of manufacturer for each product. Include published data, certified conformance report or certified laboratory test data of manufacturer substantiating each proposed product meets requirements of Contract Documents.
- C. Shop Drawings: Submit shop drawings for installation of work. Include layout for construction and control joints, typical and special details of installation and joints, sequence of installation and joints, and other pertinent data not included in submitted product data.

- D. Samples: Submit manufacturer standard size samples of each type product to be exposed to view in the completed work. Samples shall show extremes of texture, color and distortions. Samples will be reviewed only for visual characteristics.
- E. Compliance Certificate: Submit material compliance certificate issued by manufacturer, attesting each material meets requirements of Contract Documents. Compliance certificate shall be signed by manufacturer and meet applicable requirements of Section 01330 - Submittal Procedures.
- F. Installation Reports: Submit certified daily reports prepared by installer or representative of underlayment manufacturer. Each report shall indicate conditions relative to construction of underlayment, including location of placement, quantity placed, weather, including temperature and wind; material characteristics and properties, placement methods, joint details, finishing operations, curing method, unusual conditions and other like information. Reports will be only for information.

1.8 PRODUCT HANDLING

- A. General: Meet instructions and recommendations of manufacturers for handling, storing and protecting products.
- B. Containers: Deliver materials to project site packaged and sealed in moisture resistant containers bearing name of manufacturer and content information.
- C. Storage: Store and protect materials from moisture.

1.9 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain substrate, ambient air temperature and underlayment at uniform temperature between 50 and 85 degrees Fahrenheit for at least 1 day before placement, during placement and 10 days after placement.

1.10 WARRANTY

- A. Warranty materials and workmanship are to be free from defects for 3 years in accordance with requirements of Article "Warranty for Construction", FAR clause 52.246-21.

1.11 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 Society for Testing and Materials (ASTM):
C109.....Test Method for Compressive Strength

-of Hydraulic Cement Mortars
- C191.....Test Method for Time of Setting of
-Hydraulic Cement Vicat Needle
- C348.....Test Method for Flextural Strength
-of Hydraulic Cement Mortars
- E84.....Test Method for Surface Burning
-Characteristics of Building Materials
- C. Resilient Floor Covering Institute (RFCI): Recommended Method for
Preparing Concrete Subfloors Coated with Cut Back or Emulsion Tile
Adhesive, referenced in this Section as RFCI Recommendations.

PART 2 - PRODUCTS

2.1 PORTLAND CEMENT UNDERLAYMENT

- A. Underlayment: Self-leveling latex modified portland cement product
which bonds to existing substrates with following minimum properties:
 - 1. Compressive Strength: 1,500 psi after one day and 4,100 psi in 28
days when evaluated meeting requirements of ASTM C109.
 - 2. Flexural Strength: 500 psi after one day and 1,000 psi in 28 days
when evaluated meeting requirements of ASTM C348.
 - 3. Flammability: Flame spread, fuel contribution and smoke development
of 0 when evaluated meeting requirements of ASTM E84.
- B. Primer Over New Concrete: Modified acrylic emulsion alkaline resistant
as instructed and recommended by manufacturer.
- C. Primer Over Cut-Back Adhesive: Reactive acrylic primer for glazed
surfaces and for adhesive residue (cut-back) as instructed and
recommended by manufacturer.
- D. Resilient Emulsion: Polymeric additive to increase resiliency of
underlayment promoting bond resiliency over cut-back adhesives as
instructed and recommended by manufacturer.
- E. Sealer: As instructed and recommended by manufacturer.

2.2 GYPSUM UNDERLAYMENT

- A. Underlayment: Self-leveling gypsum product which bonds to existing
substrates with following minimum properties:
 - 1. Compressive Strength: 1,500 psi after one day, 4,000 psi in 28 days
when evaluated meeting requirements of ASTM C109.
 - 2. Concentrated Base Point Load: 3,500 psi on 1 inch disk at 0.007 inch
maximum indentation.

- 3. Flammability: Flame spread, fuel contribution and smoke development of 0 when evaluated meeting requirements of ASTM E84.
- B. Insulation: Polystyrene, Type IX, 1.7 pcf minimum density meeting requirements of ASTM C578 with 3 percent minimum open area evenly distributed in board surface area.
- C. Primer Over Cut-Back Adhesive: Reactive acrylic primer for glazed surfaces and for adhesive residue (cut-back) as instructed and recommended by manufacturer.
- D. Resilient Emulsion: Polymeric additive to increase resiliency of underlayment promoting bond resiliency over cut-back adhesives as instructed and recommended by manufacturer.
- E. Sealer: As instructed and recommended by manufacturer.

2.3 SMALL PATCHES UP TO 100 SF

- A. Patching Compound: Styrene butadiene or acrylic latex modified portland cement which bonds to existing substrates with following minimum properties:
 - 1. Compressive Strength: 7,200 psi in 28 days when evaluated meeting requirements of ASTM C348.

2.4 ACCESSORIES

- A. General: Each accessory material, in addition to meeting requirements specified in this Article, shall meet requirements, instructions and recommendations of manufacturer of product used with accessory material.
 - 1. Aggregate: Washed aggregate of type, characteristics and gradation meeting instructions and recommendations of manufacturer.
- B. Water: Potable, fresh, clean and clear; free of unusual or objectionable smell or taste, and deleterious substances which impair strength, durability, compatibility and appearance of work and as required by product manufacturer. Do not use water which has been used to clean equipment or tools.
- C. Primer: Latex primer as instructed and recommended by manufacturer.
- D. Sealer: Material for surface application to surfaces of underlayment to prevent dusting and staining as instructed and recommended by manufacturer.

2.5 MIXES

- A. General: Materials and proportions of underlayment mixes and methods of mixing shall meet instructions and recommendations of manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine areas and conditions under which work is to be installed for compliance with requirements of Contract Documents and to determine if conditions affecting performance of work are satisfactory. Do not proceed with the work until unsatisfactory conditions have been resolved. Commencement of installation shall constitute acceptance of existing conditions.

3.2 SUBSTRATE PREPARATION

- A. General: Remove grease, wax, curing compounds, dust and other foreign matter which might act as a bond breaker prior to application of materials. Perform preparation and cleaning of substrates meeting requirements of ACI 515.1R and ASTM C811, except as otherwise required by instructions and recommendations of manufacturer for substrate conditions.
- B. Substrates: As minimum, prepare substrates meeting following applicable requirements:
 - 1. Remove contaminants.
 - 2. Scarification: Prepare substrate by scarification as required to remove deteriorated materials which impair bonding of underlayment and patches to substrate.
 - 3. Blast entire surface clean removing and containing dust and debris.
 - 4. Existing Substrates: Locate hollow spots and delaminated substrate conditions by sounding substrate. Remove hollow sounding and delaminated areas.
 - 5. Cracks: When applicable, repair by cutting 2 inches or more below surface of substrate.
 - 6. Edges: Juncture of flooring to adjacent floor surfaces, drains and like conditions shall be free from abrupt transitions. Provide transition key at edges of flooring, except as otherwise indicated on Drawings, which shall be of detail resistant to impact from traffic flooring is required to resist. Neatly saw cut concrete substrate 1/2 inch minimum depth and chip out at an angle to 4 inches horizontal on inside of area to receive flooring. Line of juncture and edges shall be true to line and straight. Perform keying work prior to final surface preparation.

7. Dampen surface with water for a period of one hour prior to applying material. Do not leave free standing water on prepared surface.
 - a. Over Cut Back and Other Adhesive Residues: Meet requirements of RFCI Recommendations. Coordinate removal of existing finish material and preparation of substrate with requirements of RFCI Recommendations for finish material.

3.3 INSTALLATION - GENERAL

- A. General: Install work meeting requirements of Contract Documents, as indicated by final reviewed submittals for work, and meeting instructions and recommendations of product manufacturers, except where more stringent requirements are indicated by Contract Documents. Consult with manufacturers for conditions not covered by printed instructions.
- B. Substrate Condition: Substrate shall be structurally sound, clean and free of dirt, oil, grease and other contaminants.
- C. Placement:
 1. Place underlayment over substrate and spread to achieve required elevations. Maintain minimum thickness over high points of substrate as instructed by manufacturer.
 2. Uniformly slope surfaces and feather edges of underlayment as required to match existing or new elevations.
 3. Do not place underlayment against material which has obtained initial set, except at joints previously accepted by Architect.
- D. Finish Tolerance: Completed underlayment shall have a surface profile flatness tolerance (F_F) of 50 minimum overall and 32 minimum local and levelness tolerance of (F_L) of 35 minimum overall and 18 minimum local when evaluated meeting requirements of ASTM E1155 (1/8 inch maximum in 10 feet, in any direction).
- E. Traffic: Do not permit traffic over underlayment for a period of 4 hours after installation, except as otherwise instructed by manufacturer.

3.4 INSTALLATION - PORTLAND CEMENT UNDERLAYMENT

- A. Priming: Apply evenly over substrates and allow to dry to a clear thin film meeting instructions and recommendations of manufacturer. Remove any puddles.
- B. Existing Substrates: Apply resilient emulsion meeting instructions and recommendations of manufacturer.
- C. Underlayment: Place underlayment over cured primer coat and spread to thickness of 1/8 inch minimum over high points of substrate, except as otherwise instructed by manufacturer.

3.5 INSTALLATION - GYPSUM UNDERLAYMENT

- A. Priming: Apply meeting instructions and recommendations of manufacturer. Reapply primer exposed over 24 hours.
- B. Minimum Construction:
 - 1. Cast-In-Place Concrete: 3/8 inch minimum thickness with 1.4 cubic foot sand volume. Moisture test prior to application.
 - 2. Precast Plank: 3/8 inch minimum thickness with 1.4 cubic foot sand volume. Install over plank with joints grouted prior to installation.
 - 3. Wood Construction: 3/4 inch minimum thickness with 1.8 cubic foot sand volume.
 - 4. Insulation: 1 inch minimum thickness with 1.4 cubic foot sand volume.
- C. Sealer: Apply meeting instructions and recommendations of manufacturer.

3.6 INSTALLATION - SMALL PATCHES UP TO 100 SF

- A. Place patch underlayment meeting instructions and recommendations of manufacturer:
 - 1. Brush into wetted prepared surface. Place material for final grade before brushed material dries.
 - 2. Do not use mixed material which is of 15 minutes maximum age.
 - 3. Moist cure for first 24 hours.

3.7 FIELD QUALITY CONTROL

- A. Site Tests - Gypsum Underlayment: Test using 2"x2" cube molds meeting requirements of ASTM C472 as modified by gypsum underlayment manufacturer.

3.8 PROTECTION

- A. Protection: Protect work surfaces from droppings of paint, dirt and other debris by a covering of scuff-proof, non-staining, protection covering material.

- - - END - - -

SECTION 04 20 00
UNIT MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies requirements for construction of masonry unit walls, including:
 - 1. Infill of existing brick unit masonry walls.
 - 4. Miscellaneous stone masonry trim included as part of unit masonry work.

1.2 RELATED WORK

- A. Mortars and grouts: Section 04 05 13, MASONRY MORTARING, Section 04 05 16, MASONRY GROUTING.
- B. Cleaning, Repair and Replacement of Existing Brick Unit Masonry: Section 04 05 31, MASONRY RESTORATION.
- C. Steel lintels and shelf angles: Section 05 50 00, METAL FABRICATIONS.
- D. Cavity insulation: Section 07 21 13, THERMAL INSULATION.
- E. Flashing: Section 07 60 00, FLASHING AND SHEET METAL.
- F. Sealants and sealant installation: Section 07 92 00, JOINT SEALANTS.

1.3 SUBMITTALS

- A. Submit in accordance with:
 - 1. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Samples:
 - 1. Face brick, sample panel, 200 mm by 400 mm (8 inches by 16 inches,) showing full color range and texture of bricks, bond, and proposed mortar joints.
 - 2. Anchors, and ties, one each and joint reinforcing 1200 mm (48 inches) long.
- C. Shop Drawings:
 - 1. Special masonry shapes.
 - 2. Drawings, showing reinforcement, applicable dimensions and methods of hanging soffit or lintel masonry and reinforcing masonry for embedment of anchors for hung fixtures.
 - 4. Shop Drawings: Submit shop drawings for fabrication, bending, and placement of reinforcing bars. Comply with ACI 315. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabrication and placement of reinforcement for unit masonry work.

D. Certificates:

1. Certificates signed by manufacturer, including name and address of contractor, project location, and the quantity, and date or dates of shipment of delivery to which certificate applies.
2. Indicating that the following items meet specification requirements:
 - a. Face brick.
3. Testing laboratories facilities and qualifications of its principals and key personnel to perform tests specified.

E. Manufacturer's Literature and Data:

1. Anchors, ties, and reinforcement.
2. Shear keys.
3. Reinforcing bars.

1.5 SAMPLE PANEL

- A. Before starting masonry, lay up a sample panel in accordance with Masonry Standards Joint Committee (MSJC) and Brick Industry Association (BIA).
 1. Use masonry units from random cubes of units delivered on site.
 2. Include reinforcing, ties, and anchors.
- B. Use sample panels approved by Contracting Officer's Technical Representative for standard of workmanship of new masonry work.
- C. Use sample panel to test cleaning methods.

1.6 WARRANTY

- A. Warrant exterior masonry walls against moisture leaks and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be five years.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A951-06.....Steel Wire for Masonry Joint Reinforcement.
 - A615/A615M-07.....Deformed and Plain Billet-Steel Bars for
Concrete Reinforcement.
 - A675/A675M-03.....Standard Specification for Steel Bars, Carbon,
Hot-Wrought, Special Quality, Mechanical Properties
 - C34-03.....Structural Clay Load-Bearing Wall Tile
 - C62-05.....Building Brick (Solid Masonry Units Made From
Clay or Shale)
 - C67-07.....Sampling and Testing Brick and Structural Clay
Tile

- C216-07.....Facing Brick (Solid Masonry Units Made From Clay or Shale)
- C476-02.....Standard Specification for Grout for Masonry
- C612-04.....Mineral Fiber Block and Board Thermal Insulation
- D1056-07.....Flexible Cellular Materials - Sponge or Expanded Rubber
- D2000-06.....Rubber Products in Automotive Applications
- D2240-05.....Rubber Property - Durometer Hardness
- D3574-05.....Flexible Cellular Materials-Slab, Bonded, and Molded Urethane Foams
- F1667-05.....Fasteners: Nails, Spikes and Staples
- C. Masonry Industry Council:
All Weather Masonry Construction Manual, 2000.
- D. American Welding Society (AWS):
D1.4-05 Structural Welding Code - Reinforcing Steel.
- E. Federal Specifications (FS):
FF-S-107C-00.....Screws, Tapping and Drive
- F. Brick Industry Association - Technical Notes on Brick Construction (BIA):
11-1986.....Guide Specifications for Brick Masonry, Part I
11A-1988.....Guide Specifications for Brick Masonry, Part II
11B-1988.....Guide Specifications for Brick Masonry, Part III Execution
11C-1998.....Guide Specification for Brick Masonry Engineered Brick Masonry, Part IV
11D-1988.....Guide Specifications for Brick Masonry Engineered Brick Masonry, Part IV continued
- G. Masonry Standards Joint Committee; Specifications for Masonry Structures (ACI 530.1-05/ASCE 6-05/TMS 602-99) (MSJC).

PART 2 - PRODUCTS

2.1 BRICK

- A. Face Brick, FB-1:
1. ASTM C216, Grade SW, Type FBS.
 2. Efflorescence: Efflorescence negative when tested in accordance with ASTM C67.
 3. Existing Brick: Face brick shall match facing brick of existing surrounding construction as acceptable to Architect.
- B. Building Brick: ASTM C62, Grade MW for backup and interior work; Grade SW where in contact with earth.

2.2 SHEAR KEYS

- A. ASTM D2000, solid extruded cross-shaped section of rubber, neoprene, or polyvinyl chloride, with a durometer hardness of approximately 80 when tested in accordance with ASTM D2240, and a minimum shear strength of 3.5 MPa (500 psi).
- B. Shear key dimensions: Approximately 70 mm by 8 mm for long flange and 38 mm by 16 mm for short flange (2-3/4 inches by 5/16 inch for long flange, and 1-1/2 inches by 5/8 inch for short flange).

2.3 REINFORCEMENT:

- A. Steel Reinforcing Bars: ASTM A615, deformed bars, 420 MPa (Grade 60) for bars No. 10 to No. 57 (No. 3 to No. 18), except as otherwise indicated.
- B. Shop-fabricate reinforcement bars which are shown to be bent or hooked.
- C. Joint Reinforcement:
 - 1. Form from wire complying with ASTM A951.
 - 2. Galvanized after fabrication.
 - 3. Width of joint reinforcement 40 mm (1 5/8-inches) less than nominal width of masonry wall or partition.
 - 4. Cross wires welded to longitudinal wires.
 - 5. Joint reinforcing at least 3000 mm (10 feet) in length.
 - 6. Joint reinforcing in rolls is not acceptable.
 - 7. Joint reinforcing that is crimped to form drip is not acceptable.
 - 8. Maximum spacing of cross wires 400 mm (16 inches) to longitudinal wires.
 - 9. Trussed Design:
 - a. Longitudinal and cross wires not less than 4 mm (0.16 inch nominal) diameter.
 - b. Longitudinal wires deformed.
 - 10. Multiple Wythes and Cavity wall ties: Longitudinal wires 4 mm (0.16 inch) with U shape 2.6 mm (0.10 inch) rectangular ties extending into other wythe not less than 75 mm (3 inches) spaced 400 mm o.c. (16 inches). Adjustable type with U shape tie designed to receive 4 mm (0.16 inch) pintle projecting into other wythe 75 mm (3 inches) minimum.

2.4 ANCHORS, TIES, AND REINFORCEMENT

- A. Steel Reinforcing Bars: ASTM A615M, deformed bars, grade as shown.
- B. Joint Reinforcement:
 - 1. Form from wire complying with ASTM A951.
 - 2. Galvanized after fabrication.
 - 3. Width of joint reinforcement 40 mm (0.16 inches) less than nominal width of masonry wall or partition.

4. Cross wires welded to longitudinal wires.
 5. Joint reinforcement at least 3000 mm (10 feet) in length.
 6. Joint reinforcement in rolls is not acceptable.
 7. Joint reinforcement that is crimped to form drip is not acceptable.
 8. Maximum spacing of cross wires 400 mm (16 inch) to longitudinal wires.
 9. Trussed Design:
 - a. Longitudinal and cross wires not less than 4 mm (0.16 inch nominal) diameter.
 - b. Longitudinal wires deformed.
 10. Multiple Wythes and Cavity wall ties: Longitudinal wires 4 mm (0.16 inch) with U shape 4 mm (0.16 inch) rectangular ties extending into other wythe not less than 75 mm (3 inches) spaced 400 mm o.c. (16 inches). Adjustable type with U shape tie designed to receive 4 mm (0.16 inch) pintle projecting into other wythe 75 mm (3 inches min.).
- C. Individual Ties:
1. Rectangular ties: Form from 5 mm (3/16 inch) diameter galvanized steel rod to a rectangular shape not less than 50 mm (2 inches) wide by sufficient length for ends of ties to extend within 25 mm (1 inch) of each face of wall. Ties that are crimped to form drip are not permitted.
 2. Adjustable Cavity Wall Ties:
 - a. Adjustable wall ties may be used at Contractor's option.
 - b. Two piece type permitting up to 40 mm (1-1/2 inch) adjustment.
 - c. Form ties from 5 mm (3/16 inch) diameter galvanized steel wire.
 - d. Form one piece to a rectangular shape 105 mm (4-1/8 inches) wide by length required to extend into the bed joint 50 mm (2 inches).
 - e. Form the other piece to a 75 mm (3 inch) long by 75 mm (3 inch) wide shape, having a 75 mm (3 inch) long bent section for engaging the 105 mm (4-1/8 inch) wide piece to form adjustable connection.
- D. Wall Ties, (Mesh or Wire):
1. Mesh wall ties formed of ASTM A82, W0.5, 2 mm, (16 gage) galvanized steel wire 13 mm by 13 mm (1/2 inch by 1/2 inch) mesh, 75 mm (3 inches) wide by 200 mm (8 inches) long.
 2. Rectangular wire wall ties formed of W1.4, 3 mm, (9 gage) galvanized steel wire 50 mm (2 inches) wide by 200 mm (8 inches) long.
- E. Adjustable Steel Column Anchor:
1. Two piece anchor consisting of a 6 mm (1/4 inch) diameter steel rod to be welded to steel with offset ends, rod to permit 100 mm (4 inch) vertical adjustment of wire anchor.

2. Triangular shaped wire anchor 100 mm (4 inches) wide formed from 5 (3/16 inch) diameter galvanized wire, to extend at least 75 mm (3 inches) into joints of masonry.

F. Adjustable Steel Beam Anchor:

1. Z or C type steel strap, 30 mm (1 1/4 inches) wide, 3 mm (1/8 inch) thick.
2. Flange hook not less than 38 mm (1 1/2 inches) long.
3. Length to embed in masonry not less than 50 mm (2 inches) in 100 mm (4 inch) nominal thick masonry and 100 mm (4 inches) in thicker masonry.
4. Bend masonry end not less than 40 mm (1 1/2 inches).

G. Ridge Wall Anchors:

1. Form from galvanized steel not less than 25 mm (1 inch) wide by 5 mm (3/16 inch) thick by 600 mm (24 inches) long, plus 50 mm (2 inch) bends.
2. Other lengths as shown.

2.5 PREFORMED COMPRESSIBLE JOINT FILLER

- A. Thickness and depth to fill the joint as specified.
- B. Closed Cell Neoprene: ASTM D1056, Type 2, Class A, Grade 1, B2F1.
- C. Non-Combustible Type: ASTM C612, Class 5, 1800 degrees F.

2.6 ACCESSORIES

- A. Cavity Drainage Net: Non-directional, fibrous open mesh of non-absorbent, high density polyethylene strands. Thickness shall equal cavity width and be compressible to allow for variation in cavity width. Shape shall catch and hold mortar droppings as not to form solid dam and block weep holes. Net shall allow free flow of moisture in cavity to access weep holes, and permit air movement within cavity and in and out of cavity. Mesh shall be compatible with adjacent materials and shall not support growth of mold and fungus.
- B. Weep Vents - Brick Units: One piece unit made from non-directional, non-absorbent, high-density polyethylene mesh, shaped to fit in vertical mortar joint; full height, free draining and in color to match mortar as acceptable to Architect. Mesh shall be compatible with adjacent materials and not support growth of mold or fungus.
- C. Extruded Polystyrene Board Insulation: Meet requirements of Section 07 21 13, THERMAL INSULATION.
- D. Masonry Cleaner:
 1. Detergent type cleaner selected for each type masonry used.
 2. Acid cleaners are not acceptable.

3. Use soapless type specially prepared for cleaning brick as appropriate.

E. Fasteners:

1. Masonry Nails: ASTM F1667, Type I, Style 17, 19 mm (3/4 inch) minimum length.
2. Screws: FS-FF-S-107, Type A, AB, SF thread forming or cutting.

F. Sealant Joint Materials: Meet requirements of Section 07 92 00, JOINT SEALANTS.

PART 3 - EXECUTION

3.1 JOB CONDITIONS

A. Protection:

1. Cover tops of walls with nonstaining waterproof covering, when work is not in progress. Secure to prevent wind blow off.
2. On new work protect base of wall from mud, dirt, mortar droppings, and other materials that will stain face, until final landscaping or other site work is completed.

B. Cold Weather Protection:

1. Masonry may be laid in freezing weather when methods of protection are utilized.
2. Comply with MSJC and "Hot and Cold Weather Masonry Construction Manual".

3.2 CONSTRUCTION TOLERANCES

A. Lay masonry units plumb, level and true to line within the tolerances as per MSJC requirements and as follows:

B. Maximum variation from plumb:

1. In 3000 mm (10 feet) - 6 mm (1/4 inch).
2. In 6000 mm (20 feet) - 10 mm (3/8 inch).
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).

3.3 INSTALLATION GENERAL

A. Keep finish work free from mortar smears or spatters, and leave neat and clean.

B. Anchor masonry as specified in Paragraph, ANCHORAGE.

C. Wall Openings:

1. Fill hollow metal frames built into masonry walls and partitions solid with mortar as laying of masonry progresses.
2. If items are not available when walls are built, prepare openings for subsequent installation.

D. Tooling Joints:

1. Do not tool until mortar has stiffened enough to retain thumb print when thumb is pressed against mortar.
2. Tool while mortar is soft enough to be compressed into joints and not raked out.
3. Finish joints in exterior face masonry work with a jointing tool, and provide smooth, water-tight concave joint unless specified otherwise.
4. Tool Exposed interior joints in finish work concave unless specified otherwise.

E. Lintels:

1. Lintels are not required for openings less than 1000 mm (3 feet 4 inches) wide that have hollow metal frames.
2. Openings 1025 mm (3 feet 5 inches) wide to 1600 mm (5 feet 4 inches) wide with no structural steel lintel or frames, require a lintel formed of bond beam units filled with grout per ASTM C476 and reinforced with 1- #15m (1-#5) rod top and bottom for each 100 mm (4 inches) of nominal thickness unless shown otherwise.
3. Precast lintels of 25 Mpa (3000 psi) concrete, of same thickness as partition, and with one Number 5 deformed bar top and bottom for each 100 mm (4 inches) of nominal thickness, may be used in lieu of reinforced CMU masonry lintels.
4. Use steel lintels, for openings over 1600 mm (5 feet 4 inches) wide, brick masonry, and elevator openings unless shown otherwise.
5. Doors having overhead concealed door closers require a steel lintel, and a pocket for closer box.
6. Length for minimum bearing of 100 mm (4 inches) at ends.
7. Build masonry openings or arches over wood or metal centering and supports when steel lintels are not used.

G. Wall, Furring, and Partition Units:

1. Lay out field units to provide for running bond of walls and partitions, with vertical joints in second course centering on first course units unless specified otherwise.
2. Align head joints of alternate vertical courses.
3. At sides of openings, balance head joints in each course on vertical center lines of openings.
4. Use no piece shorter than 100 mm (4 inches) long.
5. On interior partitions provide a 6 mm (1/4 inch) open joint for caulking between existing construction, exterior walls, and abutting masonry partitions.
6. Use not less than 100 mm (4 inches) nominal thick masonry for free standing furring unless shown otherwise.
7. Do not abut existing plastered surfaces except suspended ceilings with new masonry partitions.

H. Before connecting new masonry with previously laid, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.

I. When new masonry partitions start on existing floors, machine cut existing floor finish material down to concrete surface.

J. Chases:

1. Do not install chases in masonry walls and partitions exposed to view in finished work, including painted or coated finishes on masonry.
2. Masonry 100 mm (4 inch) nominal thick may have electrical conduits 25 mm (1 inch) or less in diameter when covered with soaps, or other finishes.
3. Full recess chases after installation of conduit, with mortar and finish flush.
4. When pipes or conduits, or both occur in hollow masonry unit partitions retain at least one web of the hollow masonry units.

K. Wetting and Wetting Test:

1. Test and wet brick in accordance with BIA 11B.

L. Cutting and Patching:

1. Where courses of unit masonry will connect with existing unit masonry, remove each course of existing unit masonry at connection point to provide a saw-tooth pattern for bonding new unit masonry. Breaklines shall be at existing joints which shall be free of existing mortar.
2. Where areas of unit masonry are to be removed for passage of piping or electrical conduit, provide core drilled holes.

3. In general, demolish masonry in small sections. Where necessary to prevent collapse of any construction, install temporary shores, struts or bracing.
- M. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.
- N. Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete (if any). Brace, tie and support as required to maintain position and shape during construction and curing of reinforced masonry.
- O. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and all other reasonable temporary loads that may be placed on them during construction.
- P. Allow not less than the following minimum time to elapse after completion of members before removing shores or forms, provided suitable curing conditions have been obtained during the curing period.
 1. 10 days for girders and beams.
 2. 7 days for slabs.
 3. 7 days for reinforced masonry soffits.

3.4 ANCHORAGE

- A. Veneer to Frame Walls:
 1. Use adjustable veneer anchors.
 2. Fasten anchor to stud through sheathing with self-drilling and tapping screw, one at each end of loop type anchor.
 3. Space anchor not more than 400mm (16 inches) on center vertically at each stud.
- B. Masonry Facing to Backup and Cavity Wall Ties:
 1. Use individual ties for new work.
 2. Stagger ties in alternate courses, and space at 400 mm (16 inches) maximum vertically, and 600 mm (2 feet) horizontally.
 3. At openings, provide additional ties spaced not more than 900 mm (3 feet) apart vertically around perimeter of opening, and within 300 mm (12 inches) from edge of opening.
 4. Anchor new masonry facing to existing masonry with corrugated wall ties spaced at 400 mm (16 inch) maximum vertical intervals and at every second masonry unit horizontally. Fasten ties to masonry with masonry nails.
 5. Option: Use joint reinforcing for multiple wythes and cavity wall ties spaced not more than 400 mm (16 inches) vertically.

6. Tie interior and exterior wythes of reinforced masonry walls together with individual ties. Provide ties at intervals not to exceed 600 mm (24 inches) on center horizontally, and 400 mm (16 inches) on center vertically. Lay ties in the same line vertically in order to facilitate vibrating of the grout pours.

C. Anchorage of Abutting Masonry:

1. Anchor interior 100 mm (4 inch) thick masonry partitions to exterior masonry walls with wall ties. Space ties at 600 mm (2 foot) maximum vertical intervals. Extend ties 100 mm (4 inches) minimum into masonry.
2. Anchor interior masonry bearing walls or interior masonry partitions over 100 mm (4 inches) thick to masonry walls with rigid wall anchors spaced at 400 mm (16 inch) maximum vertical intervals.
3. Anchor abutting interior masonry partitions to existing masonry construction, with corrugated wall ties. Extend ties at least 100 mm (4 inches) into joints of new masonry. Fastened to existing masonry construction, with powder actuated drive pins, nail or other means that provides rigid anchorage. Install anchors at 400 mm (16 inch) maximum vertical intervals.

D. Anchorage to Steel Beams or Columns:

1. Use adjustable beam anchors on each flange.
2. At columns weld the 6 mm (1/4 inch) steel rod to steel columns at 300 mm (12 inches) intervals, and place wire ties in masonry courses at 400 mm (16 inches) maximum vertically.

3.5 REINFORCEMENT

A. Joint Reinforcement:

1. Use as joint reinforcement in CMU wythe of combination brick and CMU, cavity walls, and single wythe concrete masonry unit walls or partitions.
2. Reinforcing may be used in lieu of individual ties for anchoring brick facing to CMU backup in exterior masonry walls.
3. Locate joint reinforcement in mortar joints at 400 mm (16 inch) maximum vertical intervals.
4. Additional joint reinforcement is required in mortar joints at both 200 mm (8 inches) and 400 (16 inches) above and below windows, doors, louvers and similar openings in masonry, except where other type anchors are required for anchorage of masonry to concrete structure.
5. Joint reinforcement is required in every other course of stack bond CMU masonry.

6. Wherever brick masonry is backed up with stacked bond masonry, joint reinforcement is required in every other course of CMU backup, and in corresponding joint of facing brick.

B. Steel Reinforcing Bars:

1. Install in cells of hollow masonry units where required for vertical reinforcement and in bond beam units for lintels and bond beam horizontal reinforcement. Install in wall cavities of reinforced masonry walls where shown.
2. Use grade 60 bars if not specified otherwise.
3. Bond Beams:
 - a. Break bond beams only at expansion joints and at control joints, if shown.
4. Grout openings:
 - a. Leave cleanout holes in double wythe walls during construction by omitting units at the base of one side of the wall.
 - b. Locate 75 mm x 75 mm (3 in. x 3 in.) min. clean-out holes at location of vertical reinforcement.
 - c. Keep grout space clean of mortar accumulation and sand debris. Clean the grout space every day using a high pressure jet stream of water, or compressed air, or industrial vacuum, or by laying wood strips on the metal ties as the wall is built. If wood strips are used, lift strips with wires as the wall progresses and before placing each succeeding course of wall ties.

3.6 BRICK EXPANSION AND CMU CONTROL JOINTS.

- A. Provide brick expansion (BEJ) and CMU control (CJ) joints where shown on drawings.
- B. Keep joint free of mortar and other debris.
- C. Where joints occur in masonry walls.
 1. Install preformed compressible joint filler in brick wythe.
 2. Install cross shaped shear keys in existing brick unit wythe with preformed compressible joint filler on each side of shear key unless otherwise specified.
 3. Install filler, backer rod, and sealant on exposed faces.
- D. Interrupt steel joint reinforcement at expansion and control joints unless otherwise shown.
- E. Fill opening in exposed face of expansion and control joints with sealant as specified in Section 07 92 00, JOINT SEALANTS.

3.7 BUILDING EXPANSION AND SEISMIC JOINTS

- A. Keep joint free of mortar. Remove mortar and other debris.

- B. Install non-combustible, compressible type joint filler to fill space completely except where sealant is shown on joints in exposed finish work.
- C. Where joints are on exposed faces, provide depth for backer rod and sealant as specified in Section 07 92 00, JOINT SEALANTS, unless shown otherwise.

3.8 ISOLATION SEAL

- A. Where full height walls or partitions lie parallel or perpendicular to and under structural beams or shelf angles, provide a separation between walls or partitions and bottom of beams or shelf angles not less than the masonry joint thickness unless shown otherwise.
- B. Insert in the separation, a continuous full width strip of non-combustible type compressible joint filler.
- C. Where exposed in finish work, cut back filler material in the joint enough to allow for the joint to be filled with sealant material specified in Section 07 92 00, JOINT SEALANTS.

3.9 BRICKWORK

- A. Lay clay brick in accordance with BIA Technical Note 11 series.
- B. Laying:
 - 1. New Brickwork: Lay brick in bond pattern as indicated on Drawings.
 - 2. Existing Brickwork:
 - a. Coursing and bond pattern of new masonry work shall match comparable existing common bond pattern, as acceptable to Owner and Architect.
 - b. When courses of brick masonry will connect with existing brick masonry remove each course of existing brick masonry at connection point to provide a saw-tooth pattern for bonding new brick masonry. Breaklines shall be at existing joints which shall be free of existing mortar.
 - 3. Maintain bond pattern throughout, unless otherwise indicated by Contract Documents.
 - 4. Do not use brick smaller than half-brick at any angle, corner, break or jamb.
 - 5. Where length of cut brick is greater than one half but less than a whole brick, maintain the vertical joint location of such units.
 - 6. Lay exposed brickwork joints symmetrical about center lines of openings.
 - 7. Do not structural bond multi wythe brick walls unless shown.
 - 8. Before starting work, lay facing brick on foundation wall and adjust bond to openings, angles, and corners.

9. Lay brick for sills with wash and drip.
10. Build solid brickwork as required for anchorage of items.

C. Joints:

1. Exterior and interior joint widths: Lay for three equal joints in 200 mm (eight inches) vertically, unless shown otherwise.
2. Rake joints for pointing with colored mortar when colored mortar is not full depth.

D. Weep Holes:

1. General: Provide weep holes in outdoor wythe in head joints of first course of masonry immediately above concealed flashings. Provide weep holes in head joints of first course of masonry immediately above (direct to) thru-wall flashings. Install weep device directly on top of thru-wall flashing.
2. Open Type Weeps:
 - a. Spacing:
 - 1) Brick: Space at 600 mm (24 inch) centers.
3. Flashing Interruptions: At interruptions of vertical flashings by horizontal flashings, provide weep hole at base of vertical flashing.

E. Solid Exterior Walls:

1. Build with 100 mm (4 inches) of nominal thick facing brick, backed up with // 100 mm (4 inches) nominal thick face brick.
2. Construct solid brick jambs not less than 20 mm (.8 inches) wide at exterior wall openings and at recesses.3. Do not use full bonding headers.
3. Parging:
 - a. For solid masonry walls, lay backup to height of six brick courses, parge backup with 13 mm (1/2 inch) of mortar troweled smooth; then lay exterior wythe to height of backup.
 - b. Make parging continuous over backup, and extend 150 mm (six inches) onto adjacent masonry.
 - c. Parge, with mortar, the ends and backs for recesses in exterior walls to a thickness of 13 mm (1/2 inch).
 - d. Parge with mortar to true even surface the inside surface of exterior walls to receive insulation.

F. Cavity Type Exterior Walls:

1. Keep air space clean of mortar accumulations and debris.
 - a. Clean cavity by use of hard rubber, wood or metal channel strips having soft material on sides contacting wythes.

- b. Lift strips with wires before placing next courses of horizontal joint reinforcement, individual ties or adjustable cavity wall ties.
- 2. Cavity Drainage Net: Install cavity drainage net directly on thru-wall flashing in cavity. Net shall completely fill width of cavity from inside face of outdoor masonry wythe to outdoor face of adjacent indoor back-up construction, such as masonry wythe, sheathing or insulation. Align units and orientate adjacent ends of cavity drainage net to provide continuity as instructed by manufacturer.
- 3. For each lift lay two courses of brickmasonry units, followed by six courses of brick facing.
- 4. Insulated Cavity Type Exterior Walls:
 - a. Install the insulation against the cavity face of inner masonry wythe.
 - b. Place insulation between rows of ties or joint reinforcing or bond to masonry surface with a bonding agent as recommended by the manufacturer of the insulation.
 - c. Lay the outer masonry wythe up with an air space between insulation and masonry units.
- 5. Veneer Framed Walls:
 - a. Build with 100 mm (4 inches) of face brick over sheathed stud wall with air space.
 - b. Keep air space clean of mortar accumulations and debris.

3.10 MISCELLANEOUS STONE MASONRY

- A. Stone Trim Units: Set stone units in full bed of mortar with vertical joints completely filled with mortar. Fill dowel, anchor and similar holes solid. Wet stone joint surface thoroughly before setting. For stone surfaces that are soiled, clean bedding and exposed surfaces with fiber brush and soap powder and rinse thoroughly with clear water.

3.11 GROUTING

- A. Preparation:
 - 1. Clean grout space of mortar droppings before placing grout.
 - 2. Close cleanouts.
 - 3. Install vertical solid masonry dams across grout space for full height of wall at intervals of not more than 9000 mm (30 feet). Do not bond dam units into wythes as masonry headers.
 - 4. Verify reinforcing bars are in cells of units or between wythes as shown.
- B. Placing:
 - 1. Place grout by hand bucket, concrete hopper, or grout pump.

2. Consolidate each lift of grout after free water has disappeared but before plasticity is lost.
3. Do not slush with mortar or use mortar with grout.
4. Interruptions:
 - a. When grouting must be stopped for more than an hour, top off grout 40 mm (1-1/2 inch) below top of last masonry course.
 - b. Grout from dam to dam on high lift method.
 - c. A longitudinal run of masonry may be stopped off only by raking back one-half a masonry unit length in each course and stopping grout 100 mm (4 inches) back of rake on low lift method.

C. Puddling Method:

1. Double wythe masonry constructed grouted in lifts not to exceed 300 mm (12 inches) or less than 50 mm (2 inches) wide.
2. Consolidate by puddling with a grout stick during and immediately after placing.
3. Grout the cores of brick masonry units containing the reinforcing bars solid as the masonry work progresses.

D. Low Lift Method:

1. Construct masonry to a height of 1.5 m (5 ft) maximum before grouting.
2. Grout in one continuous operation and consolidate grout by mechanical vibration and reconsolidate after initial water loss and settlement has occurred.

E. High Lift Method:

1. Do not pour grout until masonry wall has properly cured a minimum of 4 hours.
2. Place grout in lifts not exceeding 1.5 m (5 ft).
3. Exception:

Where the following conditions are met, place grout in lifts not exceeding 3.86 m (12.67 ft).

 - a. The masonry has cured for at least 4 hours.
 - b. The grout slump is maintained between 254 and 279 mm (10 and 11 in).
 - c. No intermediate reinforced bond beams are placed between the top and the bottom of the pour height.
4. When vibrating succeeding lifts, extend vibrator 300 to 450 mm (12 to 18 inches) into the preceding lift to close any shrinkage cracks or separation from the masonry units.

3.12 PLACING REINFORCEMENT

- A. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on the Contract Drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.
- B. Position reinforcement accurately at the spacing indicated. Support and secure vertical bars against displacement. Horizontal reinforcement may be placed as the masonry work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 25 mm (1 inch), whichever is greater.
- C. Splice reinforcement bars where shown; do not splice at other places unless accepted by the Contracting Officer's Technical Representative. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.
- D. Provide not less than minimum lap as indicated on shop drawings, or if not indicated, as required by governing code.
- E. Embed metal ties in mortar joints as work progresses, with a minimum mortar cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations.
- F. Embed prefabricated horizontal joint reinforcement as the work progresses, with a minimum cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations. Lap joint reinforcement not less than 150 mm (6 inches) at ends. Use prefabricated "L" and "T" sections to provide continuity at corners and intersections. Cut and bend joint reinforcement as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
- G. Anchoring: Anchor reinforced masonry work to supporting structure as indicated.
- H. Anchor reinforced masonry walls to non-reinforced masonry where they intersect.

3.13 INSTALLATION OF REINFORCED BRICK MASONRY

A. Mortar Jointing and Bedding:

1. Pattern Bond: Lay exterior wythes in the pattern bond shown, or if not shown, lay in 1/2 running bond with vertical joints in each course centered on units in courses above and below. Lay inner wythes (if any) with all units in a wythe bonded by lapping not less than 50 mm (2 inches). Bond and interlock each course of each wythe at corners and intersections. Do not use units with less than 100 mm (4 inch) nominal horizontal face dimension at corners or jambs.
2. Lay exterior wythes with bed (horizontal) and head (vertical) joints between units completely filled with mortar. Top of bed joint mortar may be sloped toward center of walls. Butter ends of units with sufficient mortar to completely fill head joints and shove into place. Do not furrow bed joints or slush head joints. Remove any mortar fins which protrude into grout space.
3. Maintain joint widths shown for head and bed joints, except for minor variations required to maintain pattern bond. If not shown, lay with 10 mm (3/8 inch) head and bed joints.
4. Maintain joint widths shown for head and bed joints, but adjust thickness of bed joints, if required, to allow for not less than 6 mm (1/4 inch) thickness of mortar between reinforcement and masonry units, except 6 mm (1/4 inch) bars (if any) may be laid in 13 mm (1/2 inch) thick bed joints and 4.9 mm diameter (6 gage) or smaller wire reinforcing (if any) may be laid in 10 mm (3/8 inch) thick bed joints.

- #### B. Two-Wythe Wall Construction:
- Lay both wythes as previously specified for exterior wythes. Maintain grout space (collar or continuous vertical joint between wythes) of width indicated, but adjust, if required, to provide grout space not less than 13 mm (1/2 inch) wider than the sum of the vertical and horizontal (if any) reinforcement bars shown to be placed in grout space. Do not parge or fill grout space with mortar.

- C. Multi-Wythe Wall Construction: Where walls of 3 or more wythes are indicated, lay exterior wythes as previously specified. Maintain space between wythes as required to allow for laying of the number of wythes of the unit width shown with minimum grout space between wythes. Allow for not less than 19 mm (3/4 inch) of grout between wythes if non-reinforced; if reinforced, allow for a grout space not less than 13 mm (1/2 inch) wider than the sum of the vertical and horizontal (if any) reinforcement bars indicated to be placed in grout space. Place or float interior wythe units in grout poured between exterior wythes as the work progresses. Position units to allow not less than 19 mm (3/4 inch) grout between ends and sides of adjacent units.
- D. Limit extent of masonry construction to sections which do not exceed the maximum pour requirements specified hereafter. Provide temporary dams or barriers to control horizontal flow of grout at ends of wall sections. Build dams full height of grout pour. If masonry units are used, do not bond into permanent masonry wythes. Remove temporary dams after completion of grout pour.
- E. High-Lift Grouting:
1. High-Lift grouting technique may be used for the following masonry construction:
 - a. Two-wythe walls with grout spaces of 60 mm (2 1/2 inches) or greater width.
 2. Place reinforcement and support in proper position, prior to laying of masonry units, except if shown to be placed in mortar joints, place as masonry units are laid. Place horizontal bars in grout spaces on same side of vertical bars.
 3. Construct high-lift masonry by laying masonry to full height and width prior to placing grout. Provide cleanout holes in first course of masonry, and use high-pressure water jet stream to remove excess mortar from grout spaces, reinforcement bars and top surface of structural members which support wall. Clean grout spaces daily during construction of masonry.
 4. Walls: Omit every other masonry unit in first course of one wythe to provide cleanout holes. Tie wythes together with metal ties as shown or as required by code, but provide not less than 3.8 mm diameter (9 gage) wire ties spaced not more than 600 mm (24 inches) o.c. horizontally and 400 mm (16 inches) o.c. vertically for running pattern bond or 300 mm (12 inches) o.c. vertically for stack bond (if any).

5. Preparation of Grout Spaces: Prior to grouting, inspect and clean grout spaces. Remove dirt, dust, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper positioning. Clean top surface of structural members supporting masonry to ensure bond. After cleaning and inspection, close cleanout holes with matching masonry units and brace closures to resist grout pressures.
6. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure, but not less than 3 days curing time. Install shores and bracing, if required, before starting grouting operations.
7. Place grout by pumping into grout spaces, unless alternate methods are acceptable to Resident Engineer.
8. Use "Coarse Grout" per ASTM C476. Rod or vibrate each grout lift during placing and again after excess moisture has been absorbed, but before plasticity is lost. Do not penetrate or damage grout placed in previous lifts or pours.
9. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Limit pours so as not to exceed the capacity of masonry to resist displacement or loss of mortar bond due to grout pressures.
10. Do not exceed 3600 mm (12 foot) pour height.
11. Do not exceed 7600 mm (25 foot) horizontal pour dimension.
12. Where pour height exceeds 1220 mm (4 feet), place grout in a series of lifts not exceeding 1220 mm (4 feet) height. Place each lift as a continuous pouring operation. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour.
13. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 38 mm (1-1/2 inches) of top course of first pour. After grouted masonry is cured, remove temporary dams (if any), and lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence, if more pours are required.

3.14 CLEANING AND REPAIR

A. General:

1. Clean exposed masonry surfaces on completion.
2. Protect adjoining construction materials and landscaping during cleaning operations.
3. Cut out defective exposed new joints to depth of approximately 19 mm (3/4 inch) and repoint.

4. Remove mortar droppings and other foreign substances from wall surfaces.

B. Brickwork:

1. First wet surfaces with clean water, then wash down with a solution of soapless detergent. Do not use muriatic acid.
2. Brush with stiff fiber brushes while washing, and immediately thereafter hose down with clean water.
3. Free clean surfaces of traces of detergent, foreign streaks, or stains of any nature.

- - - E N D - - -

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.
- B. Items specified.
 - 1. Support for wall and ceiling mounted items.
 - 2. Frames.
 - 3. Loose lintels.
 - 4. Shelf angles.

1.2 RELATED WORK

- A. 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.
 - 4. Certification: Shop drawings for work required to meet performance requirements indicated by Contract Documents shall be certified and sealed by engineer of Contractor who performed design work covered by content of shop drawings, stating work meets most stringent requirements of Contract Documents.
- C. Samples: Submit representative samples, 12 inch square or 12 inch long as appropriate for each material or component, of each prime paint coated surface, and of each type, pattern and finish non-ferrous metal required for metal fabrication work. Submit representative samples of other materials, finished products and fabrications as may be requested by Architect. Samples will be reviewed only for color, texture, style, workmanship and finish.

D. Structural Calculations:

1. General: Submit structural calculations for work required to meet performance requirements indicated by Contract Documents, prepared in accordance with good and prudent structural engineering theory and current design practice and in accordance with appropriate design standards and rules. Submittals will be only for information.
2. Analysis: Calculations shall include analysis for required loads, including both live loads and dead loads, on supporting structure, including performance requirements specified in Paragraph - Performance Requirements, of this Section, and resultant reactions at each connection point to supporting structure. Show section property computations for framing members. Existing test reports, data from other projects, or untried or unproven theories will not be acceptable.
3. Certification: Calculations shall be certified and sealed by engineer of Contractor who performed design work covered by content of structural calculations, stating work meets most stringent requirements of Contract Documents.

E. Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning of items having anchors to be built into concrete or masonry construction.

1.4 QUALITY ASSURANCE

A. Product Qualifications:

1. Each product type shall be the same and be made by the same manufacturer.
2. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.

B. Fabricator Qualifications: Fabricator shall specialize in production and installation of work of this Section and have documented experience in design, engineering, detailing, fabrication and installation of extent, type and quality required for work. In addition, for work required to be designed, engineered and fabricated by fabricator, fabricator shall be an AISC Quality Certified Fabricator with Category Certification of Conventional Steel Buildings, minimum. Fabricator shall have successfully completed 3 projects minimum using similar systems of similar extent and complexity within past 3 years. Fabricator shall be in business 3 years minimum under same name. Provide proof of qualifications.

- C. Installer Qualifications: Installation of metal fabrications shall be performed by same firm that fabricated respective items.
- D. Engineer of Contractor Qualifications: Professional engineer of Contractor licensed to practice as a structural engineer in jurisdiction where the Work is located and experienced in providing structural engineering services that have resulted in successful installation and performance of work similar in extent, design and products to that required for the Work.
- E. Welding Qualifications:
 - 1. General: Prior to commencement of welding operations, qualify welding procedures and personnel to be employed on fabrication and installation work meeting requirements of AWS D1.1.
 - 2. Personnel: Qualifications shall remain in effect for duration of work, unless there is reason on part of Quality Control Service to question ability of welding personnel. Verification of qualifications of welding personnel required for work shall be performed by Quality Control Service at expense of Contractor, at no addition to Contract Sum.
- F. Assembled product to the greatest extent possible before delivery to the site.
- G. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.5 APPLICABLE PUBLICATIONS

- A. 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):
 - B18.6.1-81(R1997).....Wood Screws
 - B18.2.2-87(R2005).....Square and Hex Nuts
- C. American Society for Testing and Materials (ASTM):
 - A36/A36M-05.....Structural Steel
 - A47-99(R2004).....Malleable Iron Castings
 - A48-03.....Gray Iron Castings
 - A53-06.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated
Welded and Seamless
 - A123-02.....Zinc (Hot-Dip Galvanized) Coatings on Iron and
Steel Products
 - A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel
Steel Plate, Sheet and Strip

- A269-07.....Seamless and Welded Austenitic Stainless Steel
Tubing for General Service
- A307-07.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile
Strength
- A312/A312M-06.....Seamless, Welded, and Heavily Cold Worked
Austenitic Stainless Steel Pipes
- A391/A391M-01.....Grade 80 Alloy Steel Chain
- A653/A653M-07.....Steel Sheet, Zinc Coated (Galvanized) or Zinc-
Iron Alloy Coated (Galvannealed) by the Hot-Dip
Process
- B221-06.....Aluminum and Aluminum-Alloy Extruded Bars, Rods,
Wire, Shapes, and Tubes
- B456-03.....Electrodeposited Coatings of Copper Plus Nickel
Plus Chromium and Nickel Plus Chromium
- B632-02.....Aluminum-Alloy Rolled Tread Plate
- C1107-07.....Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- D3656-04.....Insect Screening and Louver Cloth Woven from
Vinyl-Coated Glass Yarns
- F436-07.....Hardened Steel Washers
- F468-06.....Nonferrous Bolts, Hex Cap Screws, and Studs for
General Use
- F593-02.....Stainless Steel Bolts, Hex Cap Screws, and Studs
- F1667-05.....Driven Fasteners: Nails, Spikes and Staples
- D. American Welding Society (AWS):
 - D1.1-04.....Structural Welding Code Steel
 - D1.2-03.....Structural Welding Code Aluminum
 - D1.3-98.....Structural Welding Code Sheet Steel
- E. National Association of Architectural Metal Manufacturers (NAAMM)
 - AMP 500-505-1988.....Metal Finishes Manual
- F. Structural Steel Painting Council (SSPC):
 - SP 1-05.....No. 1, Solvent Cleaning
 - SP 2-05.....No. 2, Hand Tool Cleaning
 - SP 3-05.....No. 3, Power Tool Cleaning
- G. Federal Specifications (Fed. Spec):
 - RR-T-650E.....Treads, Metallic and Nonmetallic, Nonskid

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. Galvanized for exterior locations.
 - 2. Type S, Grade A unless specified otherwise.
 - 3. NPS (inside diameter) as shown.
- E. Cast-Iron: ASTM A48, Class 30, commercial pattern.
- F. Malleable Iron Castings: A47.
- G. Primer Paint: As specified in Section 09 91 00, PAINTING.
- H. Stainless Steel Tubing: ASTM A269, type 302 or 304.
- I. Modular Channel Units:
 - 1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
 - 2. Form channel with in turned pyramid shaped clamping ridges on each side.
 - 3. Provide case hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn so as to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
 - 4. Factory finish channels and parts with oven baked primer when exposed to view. Channels fabricated of ASTM A525, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
 - 5. Fabricate snap-in closure plates to fit and close exposed channel openings of not more than 0.3 mm (0.0125 inch) thick stainless steel.
- J. Grout: ASTM C1107, pourable type.

2.2 HARDWARE

- A. Rough Hardware:
 - 1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
 - 2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.
- B. 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 rivets and 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 Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable 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. Anchors:

- a. Where metal fabrications are shown to be preset in concrete, weld 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 150 mm (6 inches) long with 25 mm (one inch) hooked end, to back of member at 600 mm (2 feet) on center, unless otherwise shown.
- b. Where metal fabrications are shown to be built into masonry use 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 250 mm (10 inches) long with 50 mm (2 inch) hooked end, welded to back of member at 600 mm (2 feet) on center, unless otherwise shown.

5. Cutting and Fitting:

- a. Accurately cut, machine and fit joints, corners, copes, and miters.
- b. Fit removable members to be easily removed.
- c. Design and construct field connections in the most practical place for appearance and ease of installation.
- d. Fit pieces together as required.
- e. Fabricate connections for ease of assembly and disassembly without use of special tools.
- f. Joints firm when assembled.
- g. Conceal joining, fitting and welding on exposed work as far as practical.
- h. Do not show rivets and screws prominently on the exposed face.
- i. 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.

2.4 FINISH

A. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.

B. Aluminum: NAAMM AMP 501.

1. Mill finish, AA-M10, as fabricated, use unless specified otherwise.

2. Painted: AA-C22R10.

C. Steel and Iron: NAAMM AMP 504.

1. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.

2. Surfaces exposed in the finished work:

a. Finish smooth rough surfaces and remove projections.

b. Fill holes, dents and similar voids and depressions with epoxy type patching compound.

3. Shop Prime Painting:

a. Surfaces of Ferrous metal:

1) Items not specified to have other coatings.

- 2) Galvanized surfaces specified to have prime paint.
- 3) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
- 4) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
- 5) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.

b. Non ferrous metals: Comply with MAAMM-500 series.

D. Stainless Steel: NAAMM AMP-504 Finish No. 4.

E. Protection:

1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.
2. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

2.5 SUPPORTS

A. General:

1. Fabricate ASTM A36 structural steel shapes as shown.
2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
3. Field connections may be welded or bolted.

B. For Ceiling Hung Toilet Stall:

1. Use a continuous steel channel above pilasters with hangers centered over pilasters.
2. Make provision for installation of stud bolts in lower flange of channel.
3. Provide a continuous steel angle at wall and channel braces spaced as shown.
4. Use threaded rod hangers.
5. Provide diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.
6. Provide supports for ceiling hung pilasters at dressing booths and entrance screen to toilet room similar to support for toilet stall pilasters.

C. 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.
5. Structural steel tube or channel for grab bar at water closets floor to structure above with clip angles or end plates formed for anchors.
6. Use steel angles for thru wall counters. Drill angle for fasteners at ends and not over 100 mm (4 inches) on center between ends.

D. For Trapeze Bars:

1. Construct assembly above ceilings as shown and design to support not less than a 340 kg (750 pound) working load at any point.
2. Fabricate trapeze supports as shown, with all exposed members, including screws, nuts, bolts and washers, fabricated of stainless steel.
3. Fabricate concealed components of structural steel shapes unless shown otherwise.
4. Stainless steel ceiling plate drilled for eye bolt.
5. Continuously weld connections where welds shown.
6. Use modular channel where shown with manufacturers bolts and fittings.
 - a. Weld ends of steel angle braces to steel plates and secure to modular channel units as shown. Drill plates for anchor bolts.
 - b. Fabricate eye bolt, special clamp bolt, and plate closure full length of modular channel at ceiling line and secure to modular channel unit with manufacturers standard fittings.

2.6 FRAMES

A. Frames for Breech Opening:

1. Fabricate from steel channels, or combination of steel plates and angles to size and contour shown.
2. Weld strap anchors on back of frame at not over 600 mm (2 feet) on centers for concrete or masonry openings.

2.7 GUARDS

A. Wall Corner Guards:

1. Fabricate from steel angles and furnish with anchors as shown.
2. Continuously weld anchor to angle.

B. Edge Guard Angles for Openings in slabs.

1. Fabricate from steel angles of sizes and with anchorage shown.
2. Where size of angle is not shown, provide 50 x 50 x 6 mm (2 x 2 x 1/4 inch) steel angle with 32 x 5 mm (1-1/4 x 3/16 inch) strap anchors, welded to back.

3. Miter or butt angles at corners and weld.
4. Use one anchor near end and three feet on centers between end anchors.

2.8 LOOSE LINTELS

- A. Furnish lintels of sizes shown. Where size of lintels is not shown, provide the sizes specified.
- B. Fabricate lintels with not less than 150 mm (6 inch) bearing at each end for nonbearing masonry walls, and 200 mm (8 inch) bearing at each end for bearing walls.
- C. Provide one angle lintel for each 100 mm (4 inches) of masonry thickness as follows except as otherwise specified or shown.
 1. Openings 750 mm to 1800 mm (2-1/2 feet to 6 feet) - 100 x 90 x 8 mm (4 x 3-1/2 x 5/16 inch).
 2. Openings 1800 mm to 3000 mm (6 feet to 10 feet) - 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).
- D. For 150 mm (6 inch) thick masonry openings 750 mm to 3000 mm (2-1/2 feet to 10 feet) use one angle 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).
- E. Provide bearing plates for lintels where shown.
- F. Weld or bolt upstanding legs of double angle lintels together with 19 mm (3/4 inch bolts) spaced at 300 mm (12 inches) on centers.
- G. Insert spreaders at bolt points to separate the angles for insertion of metal windows, louver, and other anchorage.
- H. Where shown or specified, punch upstanding legs of single lintels to suit size and spacing of anchor bolts.
- I. Elevator Entrance:
 1. Fabricate lintel from plate bent to channel shape, and provide a minimum of 100 mm (4 inch) bearing each end.
 2. Cut away the front leg of the channel at each end to allow for concealment behind elevator hoistway entrance frame.

2.9 SHELF ANGLES

- A. Fabricate from steel angles of size shown.
- B. Fabricate angles with horizontal slotted holes for 19 mm (3/4 inch) bolts spaced at not over 900 mm (3 feet) on centers and within 300 mm (12 inches) of ends.
- C. Provide adjustable malleable iron inserts for embedded in concrete framing.

PART 3 - EXECUTION**3.1 INSTALLATION, GENERAL**

- A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Items set into concrete or masonry.
 - 1. Provide temporary bracing for such items until concrete or masonry is set.
 - 2. Place in accordance with setting drawings and instructions.
 - 3. Build strap anchors, into masonry as work progresses.
- C. Set frames of covers, corner guards, trap doors and similar items flush with finish floor or wall surface and, where applicable, flush with side of opening.
- D. Field weld in accordance with AWS.
 - 1. Design and finish as specified for shop welding.
 - 2. Use continuous weld unless specified otherwise.
- E. 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.
- F. 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.
- G. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.
- H. 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 supports to concrete inserts by bolting or continuous welding as shown.
 - 3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts. unless shown otherwise.
 - 4. Secure steel plate or hat channels to studs as detailed.
- B. Ceiling Hung Toilet Stalls:
 - 1. Securely anchor hangers of continuous steel channel above pilasters to structure above.

2. Bolt continuous steel angle at wall to masonry or weld to face of each metal stud.
3. Secure brace for steel channels over toilet stall pilasters to wall angle supports with bolts at each end spaced as shown.
4. Install diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.
5. Install stud bolts in lower flange of channel before installing furred down ceiling over toilet stalls.
6. Install support for ceiling hung pilasters at entrance screen to toilet room similar to toilet stall pilasters.

C. Supports for Wall Mounted items:

1. Locate center of support at anchorage point of supported item.
2. Locate support at top and bottom of wall hung cabinets.
3. Locate support at top of floor cabinets and shelving installed against walls.
3. Locate supports where required for items shown.

D. Support for cantilever grab bars:

1. Locate channels or tube in partition for support as shown, and extend full height from floor to underside of structural slab above.
2. Anchor at top and bottom with angle clips bolted to channels or tube with two, 9 mm (3/8 inch) diameter bolts.
3. Anchor to floors and overhead construction with two 9 mm (3/8 inch) diameter bolts.
4. Fasten clips to concrete with expansion bolts, and to steel with machine bolts or welds.

E. Supports for Trapeze Bars:

1. Secure plates to overhead construction with fasteners as shown.
2. Secure angle brace assembly to overhead construction with fasteners as shown and bolt plate to braces.
3. Fit modular channel unit flush with finish ceiling, and secure to plate with modular channel unit manufacturer's standard fittings through steel shims or spreaders as shown.
 - a. Install closure plates in channel between eye bolts.
 - b. Install eyebolts in channel.

3.3 FRAMES

- A. Set frame flush with surface unless shown otherwise.
- B. Anchor frames at ends and not over 450 mm (18 inches) on centers unless shown otherwise.
- C. Set in formwork before concrete is placed.

3.4 GUARDS**A. Steel Angle Corner Guards:**

1. Build into masonry as the work progress.
2. Set into formwork before concrete is placed.
3. Set angles flush with edge of opening and finish floor or wall or as shown.
4. At existing construction fasten angle and filler piece to adjoining construction with 16 mm (5/8 inch) diameter by 75 mm (3 inch) long expansion bolts 450 mm (18 inches) on center.
5. Install guard angles at edges of trench, stairwell, openings in slab, overhead doors and where indicated by Contract Documents.

3.5 STEEL LINTELS

- A. Use lintel sizes and combinations shown or specified.
- B. Install lintels with longest leg upstanding, except for openings in 150 mm (6 inch) masonry walls install lintels with longest leg horizontal.
- C. Install lintels to have not less than 150 mm (6 inch) bearing at each end for nonbearing walls, and 200 mm (8 inch) bearing at each end for bearing walls.

3.6 SHELF ANGLES

- A. Anchor shelf angles with 19 mm (3/4 inch) bolts unless shown otherwise in adjustable malleable iron inserts, set level at elevation shown.
- B. Provide expansion space at end of members.

3.7 STEEL COMPONENTS FOR MILLWORK ITEMS

- A. Coordinate and deliver to Millwork fabricator for assembly where millwork items are secured to metal fabrications.

3.8 CLEAN AND ADJUSTING

- A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.
- B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

- - - E N D - - -

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies following:

1. Backing panels, wood blocking, furring, nailers and rough hardware.

1.2 RELATED WORK

A. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings showing framing connection details, fasteners, connections and dimensions.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect lumber and other products from dampness both during and after delivery at site.
- B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.
- C. Stack plywood and other board products so as to prevent warping.
- D. Locate stacks on well drained areas, supported at least 150 mm (6 inches) above grade and cover with well ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Forest and Paper Association (AFPA):
National Design Specification for Wood Construction
NDS-05.....Conventional Wood Frame Construction
- C. American Society of Mechanical Engineers (ASME):
B18.2.1A-96(R2005).....Square and Hex Bolts and Screws
B18.2.2-87(R2005).....Square and Hex Nuts
B18.6.1-81 (R97).....Wood Screws
B18.6.4-98(R2005).....Thread Forming and Thread Cutting Tapping Screws
and Metallic Drive Screws

- D. American Plywood Association (APA):
 - E30-03.....Engineered Wood Construction Guide
- E. American Society for Testing And Materials (ASTM):
 - A47-99(R2004).....Ferritic Malleable Iron Castings
 - A48-03.....Gray Iron Castings
 - A653/A653M-07.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
 - C954-04.....Steel 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
 - C1002-04.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs
 - F844-07.....Washers, Steel, Plan (Flat) Unhardened for General Use
 - F1667-05.....Nails, Spikes, and Staples
- F. Federal Specifications (Fed. Spec.):
 - MM-L-736C.....Lumber; Hardwood
- G. Commercial Item Description (CID):
 - A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)
- H. Military Specification (Mil. Spec.):
 - MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated
- I. U.S. Department of Commerce Product Standard (PS)
 - PS 1-95.....Construction and Industrial Plywood
 - PS 20-05.....American Softwood Lumber Standard

PART 2 - PRODUCTS

2.1 LUMBER

- A. Unless otherwise specified, each piece of lumber bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.
 - 1. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
 - 2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Lumber shall be FSC certified.

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. Furring, blocking, nailers and similar items 100 mm (4 inches) and narrower Standard Grade; and, members 150 mm (6 inches) and wider, Number 2 Grade.

D. Sizes:

1. Conforming to Prod. Std., PS20.
2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

E. Moisture Content:

1. At time of delivery and maintained at the site.
2. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
3. Lumber over 50 mm (2 inches) thick: 25 percent or less.

F. Fire Retardant Treatment:

1. Mil Spec. MIL-L-19140 with piece of treated material bearing identification of testing agency and showing performance rating.
2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

G. Preservative Treatment:

1. Do not treat Heart Redwood and Western Red Cedar.
2. 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 600 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members used in connection with roofing and flashing materials.
3. Treat other members specified as preservative treated (PT).
4. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper arsenate (CCA) for pressure treating wood is not permitted.

2.2 PLYWOOD

A. Comply with Prod. Std., PS 1.

B. Plywood shall not contain added urea-formaldehyde and shall be FSC certified.

- C. 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.
- D. Non-Performance Rated Plywood: Where plywood panels will be used for following types of applications, provide APA rated panels meeting requirements for grade designation, exposure durability classification, edge detail where applicable, and thickness. Plywood shall be 5 veneer plies minimum and shall bear APA grade mark. Adhesive shall be added urea-formaldehyde free.
 - 1. Backing Panels: For mounting electrical or communication equipment, provide fire retardant treated plywood panels with grade designation, APA A-A where both surfaces will be exposed in completed work or APA A-C where one surface will be exposed in completed work, Group 1 species, thickness required, but 75mm (3/4 inch) minimum thickness; Exposure Durability Classification of Exterior and square edge detail.

2.3 ROUGH HARDWARE AND ADHESIVES

A. General:

- 1. Allowable Design Loads: Provide accessories with allowable design loads as published by manufacturers that meet values required by Contract Documents. Published values of manufacturer shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent quality control service.
- 2. Protective Coatings:
 - a. General:
 - 1) Where rough carpentry is located outdoors, in contact with ground or in area of high relative humidity, provide accessories which are hot-dip zinc coated steel with zinc coating meeting requirements of ASTM A123 and ASTM A153 as applicable for accessory item, except as otherwise specified in this Article, or stainless steel, Type 304.
 - 2) Except as otherwise required by Contract Documents, prime paint ferrous metal items with acrylic base, rust inhibitive primer acceptable to Architect. Provide 51µ (2.0 mils) minimum dry film thickness. Prime painted surfaces shall be uniform.

- b. Preservative Treated Wood: Where accessories are in contact with preservative treated wood, provide accessories which have hot-dip zinc coated or stainless steel, Type 304. Zinc coating on steel sheet shall meet requirements of ASTM A653, Coating Designation G185, minimum.
- B. Anchor Bolts:
 - 1. ASME B18.2.1 and ANSI B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
 - 2. Extend at least 200 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).
- C. 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. Use 13 mm (1/2 inch) bolt unless shown otherwise.
- D. Washers
 - 1. ASTM F844.
 - 2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.
- E. Screws:
 - 1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.
 - 2. Wood to Steel: ASTM C954, or ASTM C1002.
- F. Nails:
 - 1. Size and type best suited for purpose unless noted otherwise. Use 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. Use 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.
- G. Adhesives:
 - 1. For field-gluing plywood to lumber framing floor or roof systems: ASTM D3498.
 - 2. For structural laminated Wood: ASTM D2559.

PART 3 - EXECUTION**3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS**

- A. Conform to applicable requirements of the following:
 - 1. AFPA WCD-number 1, Manual for House Framing for nailing and framing unless specified otherwise.
 - 2. APA for installation of plywood or structural use panels.
- B. Fasteners:
 - 1. Nails.
 - a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA Manual for House Framing 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 eight penny or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.
 - e. Use 16 penny or larger nails for nailing through 50 mm (2 inch) thick lumber.
 - f. Select the size and number of nails in accordance with the recommended Nailing Schedule as specified in AFPA Manual for House Framing, except for special nails with framing anchors.
 - 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 use expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
 - d. Use toggle bolts to hollow masonry or sheet metal.
 - e. Use 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 600 mm (24 inch) intervals between end bolts. Use 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 C 954 for steel over 0.84 mm (0.033 inch) thick.
 - 4. Power actuated drive pins may be used where practical to anchor to solid masonry, concrete, or steel.

5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Use 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.
- C. Cut notch, or bore in accordance with NFPA Manual for House-Framing for 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. Use longest lengths practicable.
 3. Use 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 600 mm (24 inches) between ends.
 - c. Stagger nails from side to side of wood member over 125 mm (5 inches) in width.
 5. Unless otherwise shown, use wall furring 25 mm by 75 mm (1 inch by 3 inch) continuous wood strips installed plumb on walls, using wood shims where necessary so face of furring forms a true, even plane. Space furring not over 400 mm (16 inches on centers, butt joints over bearings and rigidly secure in place. Anchor furring on 400 mm (16 inches) centers.
- E. Rough Bucks:
 1. Install rough wood bucks at opening in masonry or concrete where wood frames or trim occur.
 2. Brace and maintain bucks plumb and true until masonry has been built around them or concrete cast in place.
 3. Cut rough bucks from 50 mm (2 inch) thick stock, of same width as partitions in which they occur and of width shown in exterior walls.
 4. Extend bucks full height of openings and across head of openings; fasten securely with anchors specified.

3.2 INSTALLATION - PLYWOOD

- A. General: Meet requirements and recommendations of APA - Design/Construction Guide - Residential and Commercial, and other applicable APA recommendations.

B. Layout:

1. Install each layer of plywood with face grain perpendicular to supports and with panels continuous over two or more spans. Dimensions of panels shall not be less than 1 foot in any direction. Support edges. Plywood end joints shall occur over framing. Stagger joints one-half of plywood face dimension.
2. Install plywood with best grade face exposed in completed work or to application side for installation of subsequent materials, if applicable.

C. Fastening Methods:

1. General:

- a. Method: Securely fasten to supporting construction in manner to prevent warpage at edges and joints.
 - b. Framing: Continuously glue and nail or screw plywood panels at edges and intermediate supports to framing throughout, except as otherwise required by Contract Documents.
 - c. Fastening: Nail or screw plywood panels at 150mm (6 inch) centers along panel edges and at 300mm (12 inch) centers at intermediate supports, except as otherwise indicated by Contract Documents. Use 10 penny (3.8mm (0.148 inch diameter) minimum nails for fastening to wood framing.
2. Backing Panels: Screw or bolt to supporting structure, except as otherwise required.

- - - E N D - - -

SECTION 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies exterior and interior millwork.
- B. Items specified.
 - 1. Architectural woodwork includes woodwork exposed to view in the completed Work and fabricated to standard or custom design as applicable, primarily of wood, including high pressure laminates, and which is not a part of other work or wood systems in other Sections of Specifications.
 - 2. Architectural cabinets and countertops.
 - 3. Shelving.
 - 4. Items associated or integral with architectural woodwork, including:
 - a. Supports, reinforcement and like components, except as otherwise required by Contract Documents.
 - b. Wood grounds and blocking.
 - c. Hardware and accessories.

1.2 RELATED WORK

- A. Fabricated Metal Supports: Section 05 50 00, METAL FABRICATIONS.
- B. Framing, Furring and Blocking: Section 06 10 00, ROUGH CARPENTRY.
- C. Wood Doors: Section 08 14 00, WOOD DOORS.
- D. Countertops: Section 12 36 00, COUNTERTOPS.
- E. Electrical Light Fixtures and duplex outlets: Division 26, ELECTRICAL.

1.3 PERFORMANCE REQUIREMENTS

- A. Criteria Standard: Any item of architectural woodwork not required to be of a specific quality grade shall be provided meeting requirements of AWI - Quality Standards, Custom Grade, unless otherwise indicated by Contract Documents.
- B. Wood Moisture Content: Provide kiln-dried or seasoned lumber and maintain relative humidity during fabrication, storage, finishing and installation operations so that moisture content values of woodwork are within ranges required by referenced grading rules and woodworking standards, the more stringent requirements governing.

1.4 QUALITY ASSURANCE

- A. Single Responsibility: Architectural woodwork shall be performed by a single architectural woodwork mill, fabricator or manufacturer having undivided responsibility for providing complete architectural woodwork, including fabrication, finishing and installation.

- B. Manufacturer Qualifications: Manufacturer shall be a manufacturing member of AWI, experienced in design, detailing, fabrication, installation and maintenance of architectural woodwork, and shall be certified by AWI Quality Certification Program as competent to perform architectural woodwork of type required for work. Upon request, provide proof of qualifications.
- C. Installer Qualifications: Same as manufacturer.
- D. Quality Marking: Mark each unit of architectural woodwork with identification of mill or fabricator, grade mark and AWI Quality Certification label, located on surfaces which will not be exposed after installation.
- E. Pre-Installation Meeting: Conduct a pre-installation meeting at project site prior to delivery of materials to review conditions associated with performing work under this Section. Meeting shall include review of construction conditions, substrate conditions, environmental requirements, ambient conditions and coordination required for proper installation of work. Meeting participants shall include Architect, architectural woodwork manufacturer representative, installers of related work and firms or persons responsible for continued operation, whether temporary or permanent, of building mechanical and electrical systems as required to maintain required ambient environmental conditions. Record discussions of meeting, and participant agreements and disagreements reached, and furnish a copy of record to each participant.
- F. Product Qualifications: Provide products indicated under same category as complete units, including accessories produced by one manufacturer for the entire Work.

1.5 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, including requirements for support, reinforcement and anchorage; and provisions and cut outs for interfacing work including mechanical, plumbing and electrical work.
 - 3. Indicate compliance with specified AWI-Quality Standards and specified requirements for materials and workmanship.

C. Samples:

1. Lumber and panel products with factory-applied opaque finish, 150 mm by 300 mm (6 by 12 inches) for panels and 50 square inches for lumber, for each finish system and color, with one half of exposed surface finished.
2. Plastic Laminates: Each type, color, pattern and sheen of finish, each 150 mm by 300 mm (6 by 12 inches).
3. Each type metal, 150 mm by 300 mm (6 by 12 inches), with each respective finish.
4. Hardware: Full size sample of each hardware item.

D. Certificates:

1. Indicating preservative treatment and fire retardant treatment of materials meet the requirements specified.
2. Indicating moisture content of materials meet the requirements specified.
3. Submit copies of certificate signed by architectural woodwork mill or fabricator, certifying architectural woodwork meets requirements of quality grades and other requirements specified. Submit certificate in form recommended by applicable standards.

E. List of acceptable sealers for fire retardant and preservative treated materials.

F. Manufacturer's literature and data:

1. Finish hardware
2. Electrical components

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect lumber and millwork from dampness, maintaining moisture content specified both during and after delivery at site.
- B. Store finishing lumber and millwork in weathertight well ventilated structures or in space in existing buildings designated by Resident Engineer. Store at a minimum temperature of 21°C (70°F) for not less than 10 days before installation.
- C. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

1.7 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 of Testing and Materials (ASTM):
A36/A36M-05.....Structural Steel

- C. American National Standards Institute (ANSI):
- A117.1.....Accessible and Useable Building Facilities
 - A53-06.....Pipe, Steel, Black and Hot-Dipped Zinc Coated,
Welded and Seamless
 - A167-99 (R2004).....Stainless and Heat-Resisting Chromium-Nickel
Steel Plate, Sheet, and Strip
 - B26/B26M-05.....Aluminum-Alloy Sand Castings
 - B221-06.....Aluminum and Aluminum-Alloy Extruded Bars, Rods,
Wire, Profiles, and Tubes
 - E84-07.....Surface Burning Characteristics of Building
Materials
 - F436-07.....Hardened Steel Washers
- D. American Hardboard Association (AHA):
- A135.4-04.....Basic Hardboard
- E. Builders Hardware Manufacturers Association (BHMA):
- A156.9-03.....Cabinet Hardware
 - A156.11-04.....Cabinet Locks
 - A156.16-02.....Auxiliary Hardware
- F. Hardwood Plywood and Veneer Association (HPVA):
- HP1-04.....Hardwood and Decorative Plywood
- G. National Particleboard Association (NPA):
- A208.1-99.....Wood Particleboard
- H. American Society of Mechanical Engineers (ASME):
- B18.2.1-96(R2005).....Square and Hex Bolts and Screws (Inch Series)
- I. American Wood-Preservers' Association (AWPA):
- AWPA C1-03.....All Timber Products - Preservative Treatment by
Pressure Processes
- J. Architectural Woodwork Institute (AWI):
- AWI-2009.....Architectural Woodwork Quality Standards and
Quality Certification Program
- K. National Electrical Manufacturers Association (NEMA):
- LD 3-05.....High-Pressure Decorative Laminates
 - LD 3.1-95.....Application, Fabrication and Installation of
High-Pressure Decorative Laminates
- L. U.S. Department of Commerce, Product Standard (PS):
- PS1-95.....Construction and Industrial Plywood
 - PS20-05.....American Softwood Lumber Standard
- M. Military Specification (Mil. Spec):
- MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated

- N. Federal Specifications (Fed. Spec.):
 - A-A-1922A.....Shield Expansion
 - A-A-1936.....Contact Adhesive
 - FF-N-836D.....Nut, Square, Hexagon Cap, Slotted, Castle
 - FF-S-111D(1).....Screw, Wood
 - MM-L-736(C).....Lumber, Hardwood
- O. United States Department of Justice (USDOJ):
 - ADA.....Americans with Disabilities Act

PART 2 - PRODUCTS

2.1 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, trim, and rails: Actual size as shown or specified.
- C. Hardwood: MM-L-736, species as specified for each item.
- D. 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.
- E. Use edge grain wood members exposed to weather.

2.2 PLYWOOD

- A. General: All composite wood products shall be added urea-formaldehyde free.
- B. Softwood Plywood:
 - 1. Prod. Std.
 - 2. Grading and Marking:

- a. Each sheet of plywood shall bear the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood.
 - b. The mark shall identify the plywood by species group or identification index, and shall show glue type, grade, and compliance with PS1.
- 3. Plywood, 13 mm (1/2 inch) and thicker; not less than five ply construction, except 32 mm (1-1/4 inch) thick plywood not less than seven ply.
- 4. Plastic Laminate Plywood Cores:
 - a. Exterior Type, and species group.
 - b. Veneer Grade: A-C.
- 5. Shelving Plywood:
 - a. Interior Type, any species group.
 - b. Veneer Grade: A-B or B-C.
- 6. Other: As specified for item.
- C. Hardwood Plywood:
 - 1. HPVA: HP.1.
 - 2. Species of face veneer shall be as shown or as specified in connection with each particular item.
 - 3. Inside of Building:
 - b. Use Type II (interior) Sound Grade veneer for paint finish.

2.3 PARTICLEBOARD

- A. General: All composite wood products and agrifiber products shall be added urea-formaldehyde free
- B. Medium Density Particleboard: NPA/ANSI A208.1, medium density industrial particleboard, and meeting requirements of NPA - Specifier's Guide to Particleboard and MDF.
- C. Particleboard Cores:
 - 1. General Use: ANSI A208.1; Type 1, Grade 1-M-3, or Type 2, Grade 2-M-2, unless otherwise specified.
 - 1. Base and Wall Cabinets: ANSI A208.1; Type 1, Grade 1-M-3.
 - 2. Tops (Countertops) and Backsplashes without Sinks: ANSI A208.1; Type 1, Grade 1-M-3.
 - 3. Tops (Countertops) and Backsplashes with Sinks: ANSI A208.1; Type 2, Grade 2-M-2.

2.4 FIBERBOARD

- A. General: All composite wood products and agrifiber products shall be added urea-formaldehyde free.

- B. Medium Density Fiberboard: ANSI A208.2, medium density fiberboard, and meeting requirements of NPA - Specifier's Guide to Particleboard and MDF. Provide densities and thicknesses as required for application.

2.5 BUILDING BOARD (HARDBOARD)

- A. Building Board (Hardboard): ANSI/AHA A135.4, 6 mm (1/4 inch) minimum thickness.

2.6 PLASTIC LAMINATE

- A. High Pressure Plastic Laminate: NEMA LD-3, high pressure plastic laminate.
- B. Exposed decorative surfaces including countertops, both sides of cabinet doors, and for items having plastic laminate finish: General purpose, Type HGL, thickness as follows:
 - 1. Horizontal or High Usage Exposure: General purpose type, 1.3 mm (0.050 inch) thickness.
 - 2. Vertical or Medium Usage Exposure: General purpose type, 0.7 mm (0.028 inch) thickness.
- C. Cabinet Interiors including Shelving: Both of following options to comply with NEMA, CLS as a minimum.
 - 1. Plastic laminate clad medium density fiberboard or medium density particleboard.
- D. Balancing (Backing) Sheets: Type HGP, backing sheet, same thickness as laminate required for exposed faces.
- E. Post Forming Fabrication - Decorative Surfaces: Post forming, Type HGP, 1 mm (0.042 inch) thickness.
- F. Exposed Edges: Same type and thickness as laminate required for adjacent exposed faces, but not less than general purpose type, 1.3 mm (0.050 inch) thickness.

2.7 SOLID SURFACING

- A. Solid Surface Countertops: As specified in Section 12 36 00, COUNTERTOPS.

2.8 ADHESIVE

- A. For Plastic Laminate: Fed. Spec. A-A-1936.
- B. For Interior Millwork: Unextended urea resin, unextended melamine resin, phenol resin, or resorcinol resin.

2.9 STAINLESS STEEL

- A. General:
 - 1. Plate and Sheet: ASTM A167, Type 304 or 316.
 - 2. Shapes and Bars: ASTM A276, Type 304 or 316.

2.10 ALUMINUM CAST

- A. ASTM B26.

2.11 ALUMINUM EXTRUDED

A. ASTM B221.

2.12 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.

B. Finish Hardware

1. Exposed Finish: BHMA 630 Satin Stainless Steel finish (US26D).
2. Hat and Coat Hook:
 - a. 1 inch diameter x 1-3/4 inch deep aluminum circular coat and hat hook.
 - b. Finish: Anodized aluminum.
 - c. Acceptable Products: Peter Pepper Products, Expressive Essentials, Model 2036 Hat & Coat Hook, or equal, as acceptable to Owner and Architect.
3. Cabinet Hardware: ANSI A156.9.
 - a. Door/Drawer Pulls: B02011. Door in seismic zones: B03182.
 - b. Drawer Slides: B05051 for drawers over 150 mm (6 inches) deep, B05052 for drawers 75 mm to 150 mm 3 to 6 inches) deep, and B05053 for drawers less than 75 mm (3 inches) deep.
 - c. Sliding Door Tracks: B07063.
 - d. Adjustable Shelf Standards: B4061 with shelf rest B04083.
 - e. Concealed Hinges: B1601, minimum 110 degree opening.
 - f. Butt Hinges: B01361, for flush doors, B01381 for inset lipped doors, and B01521 for overlay doors.
 - g. Cabinet Door Catch: B0371 or B03172.
 - h. Vertical Slotted Shelf Standard: B04103 with shelf brackets B04113, sized for shelf depth.
4. Cabinet Locks: ANSI A156.11.
 - a. Drawers and Hinged Door: E07262.
 - b. Sliding Door: E07162.

5. Auxiliary Hardware: ANSI A156.16.
 - a. Wall Shelf Standards: Adjustable metal shelf supports.
 - b. Shelf Bracket: B04041, japanned or enameled finish.
 - c. Combination Garment rod and Shelf Support: B04051 japanned or enamel finish.
 - d. Closet Bar: L03131 chrome finish of required length.
 - e. Handrail Brackets: L03081 or L03101.
 - 1) Cast Aluminum, satin polished finish.
 - 2) Cast Malleable Iron, japanned or enamel finish.
6. Steel Channel Frame and Leg Supports for Countertop. Fabricated under Section 05 50 00, METAL FABRICATIONS.
7. Thru-Wall Counter Brackets:
 - a. Steel angles drilled for fasteners on 100 mm (4 inches) centers.
 - b. Baked enamel prime coat finish.
8. Edge Strips Moldings:
 - a. Driven type "T" shape with serrated retaining stem; vinyl plastic to match plastic laminate color, stainless steel, or 3 mm (1/8 inch) thick extruded aluminum.
 - b. Stainless steel or extruded aluminum channels.
 - c. Stainless steel, number 4 finish; aluminum, mechanical applied medium satin finish, clear anodized 0.1 mm (0.4 mils) thick.
9. Rubber or Vinyl Molding:
 - a. Rubber or vinyl standard stock and in longest lengths practicable.
 - b. Design for closures at joints with walls and adhesive anchorage.
 - c. Adhesive as recommended by molding manufacturer.
10. Primers: Manufacturer's standard primer for steel providing baked enamel finish.

2.13 MOISTURE CONTENT

- A. Moisture content of lumber and millwork at time of delivery to site.
 1. Interior finish lumber, trim, and millwork 32 mm (1-1/4 inches) or less in nominal thickness: 12 percent on 85 percent of the pieces and 15 percent on the remainder.
 2. Exterior treated or untreated finish lumber and trim 100 mm (4 inches) or less in nominal thickness: 15 percent.
 3. Moisture content of other materials shall be in accordance with the standards under which the products are produced.

2.14 FIRE RETARDANT TREATMENT

- A. Where wood members and plywood are specified to be fire retardant treated, the treatment shall be in accordance with Mil. Spec. MIL-L19140.

- B. Treatment and performance inspection shall be by an independent and qualified testing agency that establishes performance ratings.
- C. Each piece of treated material shall bear identification of the testing agency and shall indicate performance in accordance with such rating of flame spread and smoke developed.
- D. Treat wood for maximum flame spread of 25 and smoke developed of 25.
- E. Fire Resistant Softwood Plywood:
 - 1. Use Grade A, Exterior, plywood for treatment.
 - 2. Meet the following requirements when tested in accordance with ASTM E84.
 - a. Flame spread: 0 to 25.
 - b. Smoke developed: 100 maximum
- F. Fire Resistant Hardwood Plywood:
 - 1. Core: Fire retardant treated softwood plywood.
 - 2. Hardwood face and back veneers untreated,
 - 3. Factory seal panel edges, to prevent loss of fire retardant salts.

2.15 PRESERVATIVE TREATMENT

- A. Wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including wood members used for rough framing of millwork items except heart-wood Redwood and Western Red Cedar shall be preservative treated in accordance with AWP Standards.
- B. Use Grade A, exterior plywood for treatment.

2.16 FABRICATION

- A. General:
 - 1. Except as otherwise specified, use AWI Custom Grade for architectural woodwork and interior millwork.
 - 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.
 - 4. Plywood shall be not less than 13 mm (1/2 inch), unless otherwise shown or specified.
 - 5. Edges of members in contact with concrete or masonry shall have a square corner caulking rebate.
 - 6. Fabricate members less than 4 m (14 feet) in length from one piece of lumber, back channeled and molded as shown.
 - 7. Interior trim and items of millwork to be painted may be fabricated from jointed, built-up, or laminated members, unless otherwise shown on drawings or specified.

8. Pre-Cut Openings: Fabricate architectural woodwork with pre-cut openings, to receive hardware, equipment, fixtures, electrical work and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges of cutouts with water resistant coating.

B. Plastic Laminate Work:

1. Factory glued to either a medium density fiberboard or medium density particleboard core, thickness as shown or specified.
2. Cover exposed edges with plastic laminate, except where aluminum, stainless steel, or plastic molded edge strips are shown or specified. Use plastic molded edge strips on 19 mm (3/4-inch) molded thick or thinner core material.
3. Provide balancing (backing) sheets for 100 percent of back, or concealed faces or surfaces of plastic laminate covered surfaces or members, including back splashes and end splashes of countertops, without exception.
4. Use balancing (backing) sheet on concealed large panel surface when decorative face does not occur.

- C. Welded Steel Components: Welded steel components with surfaces exposed and semi-exposed in work shall not show evidence of being welded. Corners shall be square and uniform with no fillet and not discolored from welding process.

2.17 FINISHING

- A. General: Entire finish of architectural woodwork is work of this Section, regardless of whether shop applied or applied after installation.
- B. Standard: Meet requirements of AWI - Quality Standards, Section 1500, as applicable to each item of architectural woodwork and respective quality grade required.
- C. Shop Finishing: To greatest extent possible, finish architectural woodwork at shop or factory. Defer final touch-up, cleaning and polishing after delivery and installation.
- D. Preparations: Sand, fill countersunk fasteners, back prime and perform similar preparations for finishing of architectural woodwork, as applicable to each unit of work and quality grade of woodwork required.

E. Opaque Paint Finish - Close Grained Wood:

1. Standard: AWI Finish System OP-6 - Opaque Catalyzed Polyurethane, Custom Grade, close grained wood finish. Finish shall be capable of being touched up and repaired at project site without repair being noticeable as acceptable to Architect.
2. Color and Sheen: Finish color and sheen shall be as selected by Architect from standard color and finish sheen range of finish manufacturer. Unless otherwise selected by Architect, provide uniform 40 satin sheen, 30 to 50 degree sheen on 60 degree Gloss Meter.

2.18 WOODWORK ITEMS

A. Architectural Cabinets - High Pressure Plastic Laminate:

1. Description: Architectural cabinets with high pressure laminate, includes base and wall cabinets, and associated components, including but not limited to metal components, cabinet hardware glass and appurtenances.
2. Standard and Grade: AWI Quality Standards, Section 400 and Section 400B - Laminate Cabinets, Custom Grade.
3. Type Construction: Flush overlay.
4. Exposed and Semi-Exposed Surfaces:
 - a. Plastic Laminate: High pressure plastic laminate, color throughout, as specified in this Section for high usage exposure and with eased exterior corner edges. Not for chemical and heat resistance usage.
 - b. Balancing (Backing) Sheet: As specified in this Section for 100 percent of back or concealed surfaces.
5. Edge Treatment: High pressure plastic laminate banded, same as specified in this Paragraph for exposed surfaces, with eased exterior corner edges.
6. Core: Medium density fiberboard or medium density particleboard, 19 mm (3/4 inch) minimum thickness.
7. Dust Panels: Provide dust panels of 6 mm (1/4 inch) plywood or tempered hardboard above compartments and drawers, except where located directly under tops.
8. Hardware: Components as required and meeting applicable hardware requirements specified in this Section.

B. Architectural Countertops - Solid Surfacing:

1. Description: Architectural countertops, and sills and like components associated with architectural woodwork fabricated of solid polymer plastic, and including hardware components and meeting requirements of Section 12 36 00, COUNTERTOPS.
2. Standard and Grade: Custom Grade
3. Hardware: Components as required and meeting applicable requirements specified in this Section.

C. Architectural Countertops - High Pressure Plastic Laminate:

1. Description: Architectural countertops with high pressure plastic laminate, includes hardware components. Excludes steel support frames.
2. Standard and Grade: AWI Quality Standards, Section 400 and Section 400C, Custom Grade.
3. Exposed and Semi-Exposed Surfaces:
 - a. Plastic Laminate: High pressure plastic laminate, as specified in this Section for high usage exposure and with eased exterior corner edges. Not for chemical and heat resistance usage.
 - b. Balancing Sheet: As specified in this Section for 100 percent of back or concealed surfaces.
4. Core: Medium density fiberboard or medium density particleboard, 3/4 in (19 mm) minimum thickness.
5. Hardware: Components as required and meeting applicable hardware requirements specified in this Section.

D. Open Shelving - High Pressure Plastic Laminate:

1. Description: Open shelving with high pressure plastic laminate supported by standards and brackets, includes associated hardware.
2. Standard and Grade: AWI Quality Standards, Section 600, Custom Grade.
3. Exposed Surfaces: High pressure plastic laminate, standard, as specified in this Section for high usage exposure and with eased exterior corner edges. Not for chemical and heat resistance usage.
4. Core: Medium density fiberboard or medium density particleboard, 19 mm (3/4 inch) minimum thickness.
5. Hardware: Type as follows and as specified in this Section:
 - a. Wall shelf standards.
 - b. Wall shelf brackets.

PART 3 - EXECUTION**3.1 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain work areas and storage areas to a minimum temperature of 21⁰C (70⁰F) for not less than 10 days before and during installation of interior millwork.
- B. Do not install finish lumber or millwork in any room or space where wet process systems such as concrete, masonry, or plaster work is not complete and dry.

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. Seal cut edges of preservative and fire retardant treated wood materials with a certified acceptable sealer.
 - 5. Coordinate with plumbing and electrical work for installation of fixtures and service connections in millwork items.
 - 6. Plumb and level items unless shown otherwise.
 - 7. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailings, countersunk and filed flush with woodwork, and matching final finish where transparent finish is required.
 - 8. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.
 - 9. Exterior Work: Joints shall be close fitted, metered, tongue and grooved, rebated, or lapped to exclude water and made up in thick white lead paste in oil.
- B. Trim: Install with minimum number of joints using full-length pieces for each run of application to greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and meet AWI Quality Standards for joinery.

- C. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as required.
- D. Countertops: Anchor securely to base units and other support systems as applicable.
- E. Shelves:
 - 1. Install mounting strip at back wall and end wall for shelves in closets where shown secured with toggle bolts at each end and not over 600 mm (24 inch) centers between ends.
 - a. Nail Shelf to mounting strip at ends and to back wall strip at not over 900 mm (36 inches) on center.
 - b. Install metal bracket, ANSI A156.16, B04041, not over 1200 mm (4 feet) centers when shelves exceed 1800 mm (6 feet) in length.
 - c. Install metal bracket, ANSI A156.16, B04051, not over 1200 mm (4 feet) on centers where shelf length exceeds 1800 mm (6 feet) in length with metal rods, clothes hanger bars ANSI A156.16, L03131, of required length, full length of shelf.
 - 2. Install vertical slotted shelf standards, ANSI A156.9, B04103 to studs with toggle bolts through each fastener opening. Double slotted shelf standards may be used where adjacent shelves terminate.
 - a. Install brackets ANSI A156.9, B04113, providing supports for shelf not over 900 mm (36 inches) on center and within 13 mm (1/2 inch) of shelf end unless shown otherwise.
 - b. Install shelves on brackets so front edge is restrained by bracket.

3.3 ADJUSTING CLEANING

- A. Adjusting: Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Cleaning:
 - 1. General: Clean woodwork on exposed and semi-exposed surfaces. Touch-up finishes to restore damaged or soiled areas.
 - 2. Hardware: Clean hardware, lubricate and make final adjustments for proper operation.
- C. Protection:
 - 1. General: Protect architectural woodwork and maintain conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

2. Protective Cleaning: Cover completed work with protective covering, applied in a manner which will allow easy removal and without damage to woodwork or adjoining work. Remove cover immediately before the time of final acceptance.

3.4 FINISH CARPENTRY SCHEDULE

A. Plastic Laminate:

1. Plastic Laminate, HPDL-1:
 - a. Type: Wilsonart.
 - b. Color: 1572-60 Antique White, Matte Finish.
2. Plastic Laminate, HPDL-2:
 - a. Type: Wilsonart.
 - b. Color: 7064-60 Wild Cherry, Matte Finish.

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**SECTION 07 21 13
THERMAL INSULATION**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies thermal and acoustical insulation for buildings.
- B. Acoustical insulation is identified by thickness and words "Acoustical Insulation".

1.2 RELATED WORK

- A. Safing Insulation: Section 07 84 00, FIRESTOPPING.

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. Insulation, each type used
 - 2. Adhesive, each type used.
 - 3. Tape
- C. Certificates: Stating the type, thickness and "R" value (thermal resistance) of the insulation to be installed.

1.5 STORAGE AND HANDLING

- A. Store insulation materials in weathertight enclosure.
- B. Protect insulation from damage from handling, weather and construction operations before, during, and after installation.

1.6 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - C552-07.....Cellular Glass Thermal Insulation.
 - C553-08.....Mineral Fiber Blanket Thermal Insulation for
Commercial and Industrial Applications
 - C591-08.....Unfaced Preformed Rigid Cellular
Polyisocynurate Thermal Insulation
 - C612-04.....Mineral Fiber Block and Board Thermal
Insulation

C665-06.....	Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
C954-07.....	Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Base to Steel Studs From 0.033 (0.84 mm) inch to 0.112 inch (2.84 mm) in thickness
C1002-07.....	Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
C1029.....	Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
C1289.....	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
E84-08.....	Surface Burning Characteristics of Building Materials
F1667-05.....	Driven Fasteners: Nails, Spikes and Staples

PART 2 - PRODUCTS

2.1 INSULATION - GENERAL

- A. Where thermal resistance ("R" value) is specified or shown for insulation, the thickness shown on the drawings is nominal. Use only insulation with actual thickness that is not less than that required to provide the thermal resistance specified.
- B. Where "R" value is not specified for insulation, use the thickness shown on the drawings.
- C. Where more than one type of insulation is specified, the type of insulation for each use is optional, except use only one type of insulation in any particular area.

- D. Insulation Products shall comply with following minimum recovered material content standards for recovered materials:

Material Type	Percent by Weight
Polyisocyanurate/polyurethane	
Rigid foam	9 percent recovered material
Foam-in-place	5 percent recovered material
Glass fiber reinforced	6 percent recovered material
Cotton fiber	80 percent recovered material
Rock wool material	75 percent recovered material

The minimum-content standards are based on the weight (not the volume) of the material in the insulating core only.

2.2 SPRAY FOAM INSULATION

- A. Spray Foam Insulation: ASTM C1029, Type 1, closed cell, medium density, 1.9 - 2.4 pounds per cubic foot density, low-VOC, MDI-based polyurethane thermoset rigid foam, with thermal resistance (R-value) at 75F of 5.8 for each 1 inch thickness applied at a thickness less than 2 inches and thermal resistance (R-value) at 75F of 6.4 for each 1 inch thickness applied at thickness greater than 2 inches. Water vapor transmission shall be 1.51 perms maximum at 1 inch.

2.3 EXTERIOR FRAMING OR FURRING INSULATION:

- A. Batt or Blanket: Optional.
- B. Mineral Fiber: ASTM C665, Type II, Class C, Category I where framing is faced with gypsum board.
- C. Mineral Fiber: ASTM C665, Type III, Class A where framing is not faced with gypsum board.

2.4 INTERIOR FURRING, FRAMING AND ACOUSTICAL INSULATION

- A. Cotton Fiber Blanket/Batt: ASTM C665, Type I, 1.2 pounds per cubic foot minimum density, thermal and sound attenuation blanket or batt insulation produced by thermally bonding post-industrial natural cotton fibers and treating with borate solution. Maximum flame spread of 25 and smoke developed of 35 when tested in accordance with ASTM E84. 80 percent minimum post-industrial recycled content.

B. Acceptable Products:

1. Bonded Logic, LLC, Ultra Touch, or equal, as acceptable to Owner and Architect.

2.5 RIGID INSULATION

- A. On the inside face of exterior walls, spandrel beams, floors, bottom of slabs, and where shown.
- B. Mineral Fiber Board: ASTM C612, Type IB or 2.
- C. Faced Polyisocyanurate Board: ASTM C1289, Type I, Class 2, Class A fire rated, faced with aluminum foil thermal barrier on both sides, and with thermal resistance (R-value) at 75F of 6.5 for each 1 inch thickness.

2.6 FASTENERS

- A. Staples or Nails: ASTM F1667, zinc-coated, size and type best suited for purpose.
- B. Screws: ASTM C954 or C1002, size and length best suited for purpose with washer not less than 50 mm (two inches) in diameter.
- C. Impaling Pins: Steel pins with head not less than 50 mm (two inches) in diameter with adhesive for anchorage to substrate. Provide impaling pins of length to extend beyond insulation and retain cap washer when washer is placed on the pin.

2.7 ADHESIVE

- A. Insulation adhesive, low-VOC, as recommended by the manufacturer of the insulation.

2.8 TAPE

- A. Pressure sensitive adhesive on one face.
- B. Perm rating of not more than 0.50.

PART 3 - EXECUTION**3.1 INSTALLATION - GENERAL**

- A. Install insulation with the vapor barrier facing the heated side, unless specified otherwise.
- B. Install rigid insulating units with joints close and flush, in regular courses and with cross joints broken.
- C. Install batt or blanket insulation with tight joints and filling framing void completely. Seal cuts, tears, and unlapped joints with tape.

- D. Fit insulation tight against adjoining construction and penetrations, unless specified otherwise.

3.2 EXTERIOR FRAMING OR FURRING BLANKET INSULATION:

- A. Pack insulation around door frames and windows and in building expansion joints, door soffits and other voids. Pack behind outlets around pipes, ducts, and services encased in walls. Open voids are not permitted. Hold insulation in place with pressure sensitive tape.
- B. Lap vapor retarder flanges together over face of framing for continuous surface. Seal all penetrations through the insulation.
- C. Fasten blanket insulation between metal studs or framing and exterior wall furring by continuous pressure sensitive tape along flanged edges.
- D. Fasten blanket insulation between framing with nails or staples through flanged edges on face of stud. Space fastenings not more than 150 mm (six inches) apart.

3.3 RIGID INSULATION ON SURFACE OF EXTERIOR WALLS AND UNDERSIDE OF FLOORS

- A. On the interior face of solid masonry and concrete walls, beams, beam soffits, underside of floors, and to the face of studs for interior wall finish where shown.
- B. Use mineral fiber board, unless use of faced polyisocyanurate board is otherwise indicated by Contract Documents.
- C. Bond to solid vertical surfaces with adhesive as recommended by insulation manufacturer. Fill joints with adhesive cement.
- D. For faced polyisocyanurate insulation boards, also cover seams between insulation boards with type of tape recommended by insulation manufacturer. Seal joints between boards as well as joints between boards and surrounding construction to ensure airtight installation and continuous thermal barrier.
- E. Use impaling pins for attachment to underside of horizontal surfaces. Space fastenings as required to hold insulation in place and prevent sagging.
- F. Fasten board insulation to face of studs with screws, nails or staples. Space fastenings not more than 300 mm (12 inches) apart. Stagger fasteners at joints of boards. Install at each corner.

3.4 INTERIOR FURRING, FRAMING AND ACOUSTICAL INSULATION

- A. Fasten cotton fiber blanket insulation between metal studs and wall furring with continuous pressure sensitive tape along edges or adhesive.

- B. Pack insulation around door frames and windows and in cracks, expansion joints, control joints, door soffits and other voids. Pack behind outlets, around pipes, ducts, and services encased in wall or partition. Hold insulation in place with pressure sensitive tape or adhesive.
- C. Do not compress insulation below required thickness except where embedded items prevent required thickness.
- D. Where acoustical insulation is installed above suspended ceilings install blanket at right angles to the main runners or framing. Extend insulation over wall insulation systems not extending to structure above.

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**SECTION 07 60 00
FLASHING AND SHEET METAL**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Formed sheet metal work for wall flashing is specified in this section.

1.2 RELATED WORK

- A. Joint Sealants: Section 07 92 00, JOINT SEALANTS.
B. Integral flashing components of manufactured accessories or equipment
Division 22, PLUMBING sections and Division 23 HVAC sections.
C. Paint materials and application: Section 09 91 00, PAINTING.

1.3 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. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.
- B. Aluminum Association (AA):
- AA-C22A41.....Aluminum Chemically etched medium matte, with
clear anodic coating, Class I Architectural,
0.7-mil thick
- AA-C22A42.....Chemically etched medium matte, with integrally
colored anodic coating, Class I Architectural,
0.7 mils thick
- AA-C22A44.....Chemically etched medium matte with
electrolytically deposited metallic compound,
integrally colored coating Class I
Architectural, 0.7-mil thick finish
- B. American Architectural Manufacturers Association (AAMA):
- AAMA 620.....Voluntary Specification for High Performance
Organic Coatings on Coil Coated Architectural
Aluminum

- AAMA 621.....Voluntary Specification for High Performance
Organic Coatings on Coil Coated Architectural
Hot Dipped Galvanized (HDG) and Zinc-Aluminum
Coated Steel Substrates
- C. ASTM International (ASTM):
- A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel
Steel Plate, Sheet, and Strip
- A653/A653M-09.....Steel Sheet Zinc-Coated (Galvanized) or Zinc
Alloy Coated (Galvanized) by the Hot- Dip
Process
- B32-08.....Solder Metal
- B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate
- D173-03.....Bitumen-Saturated Cotton Fabrics Used in
Roofing and Waterproofing
- D412-06.....Vulcanized Rubber and Thermoplastic Elastomers-
Tension
- D1187-97(R2002).....Asphalt Base Emulsions for Use as Protective
Coatings for Metal
- D4586-07.....Asphalt Roof Cement, Asbestos Free
- D. Sheet Metal and Air Conditioning Contractors National Association
(SMACNA): Architectural Sheet Metal Manual.
- E. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual
- F. Federal Specification (Fed. Spec):
A-A-1925A.....Shield, Expansion; (Nail Anchors)
- G. International Code Commission (ICC): International Building Code,
Current Edition

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT
DATA, AND SAMPLES.
- B. Shop Drawings: For all specified items, including:
1. Flashings
- C. Manufacturer's Literature and Data: For all specified items, including:
1. Two-piece counterflashing
 2. Thru wall flashing
 3. Nonreinforced, elastomeric sheeting

- D. Certificates: Indicating compliance with specified finishing requirements, from applicator and contractor.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

- A. Stainless Steel: ASTM A167, Type 302B, dead soft temper.
- B. Aluminum Sheet: ASTM B209, alloy 3003-H14 //except alloy used for color anodized aluminum shall be as required to produce specified color.
Alloy required to produce specified color shall have the same structural properties as alloy 3003-H14//.
- C. Galvanized Sheet: ASTM, A653.
- D. Nonreinforced, Elastomeric Sheet: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet (0.056 inch) thick. Sheet shall have not less than 7 MPa (1,000 psi) tensile strength and not more than seven percent tension-set at 50 percent elongation when tested in accordance with ASTM D412. Sheet shall show no cracking or flaking when bent through 180 degrees over a 1 mm (1/32 inch) diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -30°C (-20 °F).

2.2 FLASHING ACCESSORIES

- A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.
- B. Rosin Paper: Fed-Spec. UU-B-790, Type I, Grade D, Style 1b, Rosin-sized sheathing paper, weighing approximately 3 Kg/10 m²(6 lbs/100 sf).
- C. Bituminous Paint: ASTM D1187, Type I.
- D. Fasteners:
 - 1. Use stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
 - 2. Nails:
 - a. Minimum diameter for aluminum nails 3 mm (0.105 inch).
 - b. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
 - c. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
 - 3. Rivets: Not less than 3 mm (1/8 inch) diameter.

- 4. Expansion Shields: Fed Spec A-A-1925A.
- E. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.
- F. Roof Cement: ASTM D4586.

2.3 SHEET METAL THICKNESS

- A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:
- B. Concealed Locations (Built into Construction):
 - 1. Stainless steel: 0.25 mm (0.010 inch) thick.
 - 2. Galvanized steel: 0.5 mm (0.021 inch) thick.
- C. Exposed Locations:
 - 1. Stainless steel: 0.4 mm (0.015 inch).
- D. Thickness of aluminum or galvanized steel is specified with each item.

2.4 FABRICATION, GENERAL

- A. Jointing:
 - 1. In general stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
 - 2. Jointing of stainless steel over 0.45 mm (0.018 inch) thick shall be done by lapping, riveting and soldering.
 - 3. Joints shall conform to following requirements:
 - a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
 - b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.
 - c. Unsoldered lap joints shall finish not less than 100 mm (4 inches) wide.
 - 4. Flat and lap joints shall be made in direction of flow.
 - 5. Soldering:
 - a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of uncoated stainless steel.
 - b. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
 - c. Completely remove acid and flux after soldering is completed.

B. Expansion and Contraction Joints:

1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
2. Space joints as shown or as specified.
3. Space expansion and contraction joints for stainless steel, at intervals not exceeding 7200 mm (24 feet).
4. Space expansion and contraction joints for aluminum at intervals not exceeding 5400 mm (18 feet), except do not exceed 3000 mm (10 feet) for gravel stops and fascia-cant systems.
5. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
6. Fabricate joint covers of same thickness material as sheet metal served.

C. Cleats:

1. Fabricate cleats to secure flashings and sheet metal work over 300 mm (12 inches) wide and where specified.
2. Provide cleats for maximum spacing of 300 mm (12 inch) centers unless specified otherwise.
3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.
4. Fabricate cleats from 50 mm (2 inch) wide strip. Form end with not less than 19 mm (3/4 inch) wide loose lock to item for anchorage. Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

D. Edge Strips or Continuous Cleats:

1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
2. Except as otherwise specified, fabricate edge strips or minimum 0.6 mm (0.024 inch) thick stainless steel or 1.25 mm (0.050 inch) thick aluminum.
3. Use material compatible with sheet metal to be secured by the edge strip.
4. Fabricate in 3000 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.

5. Fabricate anchor edge maximum width of 75 mm (3 inches) or of sufficient width to provide adequate bearing area to insure a rigid installation using 0.8 mm (0.031 inch) thick stainless steel or 1.6 mm (0.0625 inch) thick aluminum.

E. Drips:

1. Form drips at lower edge of sheet metal counter-flashings (cap flashings) by folding edge back 13 mm (1/2 inch) and bending out 45 degrees from vertical to carry water away from the wall.
2. Form drip to provide hook to engage cleat or edge strip for fastening for not less than 19 mm (3/4 inch) loose lock where shown.

F. Edges:

1. Edges of flashings concealed in masonry joints opposite drain side shall be turned up 6 mm (1/4 inch) to form dam, unless otherwise specified or shown otherwise.
2. Finish exposed edges of flashing with a 6 mm (1/4 inch) hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Use 6 mm (1/4 inch) minimum penetration beyond wall face with drip for through-wall flashing exposed edge.

G. Metal Options:

1. Where options are permitted for different metals use only one metal throughout.
2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.

2.5 FINISHES

- A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
- B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.
- C. Finish exposed metal surfaces as follows, unless specified otherwise:
 1. Stainless Steel: Finish No. 2B or 2D.
 2. Aluminum:
 - a. Fluorocarbon Finish: AAMA 620, high performance organic coating.
 3. Steel and Galvanized Steel:
 - a. Finish painted under Section 09 91 00, PAINTING unless specified as prefinished item.
 - b. Manufacturer's finish:
 - 1) Baked on prime coat over a phosphate coating.

- 2) Baked-on prime and finish coat over a phosphate coating.
- 3) Fluorocarbon Finish: AAMA 621, high performance organic coating.

2.6 THROUGH-WALL FLASHINGS

- A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 2 mm (1/16 inch) deep transverse channels spaced four to every 25 mm (one inch), or ribbed diagonal pattern, or having other deformation unless specified otherwise.
 1. Fabricate in not less than 2400 mm (8 feet) lengths; 3000 mm (10 feet) maximum lengths.
 2. Fabricate so keying nests at overlaps.
- B. For Masonry Work When Concealed Except for Drip:
 1. Stainless steel.
 2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
 3. Form exposed portions of flashing with drip, approximately 6 mm (1/4 inch) projection beyond wall face.
- C. Window Sill Flashing:
 1. Use stainless steel or nonreinforced elastomeric sheeting.
 2. Fabricate flashing at ends with folded corners to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening.
 3. Turn up back edge as shown.
 4. Form exposed portion with drip as specified or receiver.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
 2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
 3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.

4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the flashing material used.
5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
6. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
7. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
8. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
9. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
10. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
11. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
12. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
 - a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
 - b. Paint dissimilar metal with a coat of bituminous paint.
 - c. Apply an approved caulking material between aluminum and dissimilar metal.
13. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of bituminous paint.

14. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry building walls; at top of concrete floors; under masonry, concrete, or stone copings and elsewhere as shown.
2. Where exposed portions are used as a counterflashings, lap base flashings at least 100 mm (4 inches) and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.
5. Turn back edge up 6 mm (1/4 inch) unless noted otherwise where flashing terminates in mortar joint or hollow masonry unit joint.
6. Terminate interior raised edge in masonry backup unit approximately 38 mm (1 1/2 inch) into unit unless shown otherwise.
7. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.
8. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.
9. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.
10. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
11. Turn flashing up not less than 200 mm (8 inch) between masonry or behind exterior veneer.
12. When flashing terminates in reglet extend flashing full depth into reglet and secure with lead or plastic wedges spaced 150 mm (6 inch) on center.

B. Window Sill Flashing:

1. Install flashing to extend not less than 100 mm (4 inch) beyond ends of sill into vertical joint of masonry or veneer.
2. Turn back edge up to terminate under window frame.
3. Turn ends up 25 mm (one inch) and fold corners to form dam and extend to face of wall.

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SECTION 07 83 50
SLEEVES AND SEALS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies:

1. Sleeves to form openings through building construction to allow for penetrations of piping, ducts, conduits, cables, wiring and like items, except as otherwise required.
2. Sleeves to form openings through existing building construction to allow for penetrations of piping, ducts, conduits, cables, wiring and like items, and performing adjustments to sleeves as required by actual construction conditions, except as otherwise required.

B. Schedule: Required types and applications of sleeves and seals include, but are not limited to, types and application locations specified in Article - Sleeve and Seal Schedule, at end of this Section.

1.2 RELATED WORK

A. General:

1. Providing non-sleeved formed openings through building construction to allow for penetrations.
2. Installation or setting of sleeves to be installed in adjacent building construction.
3. Structural supports, lintels and like devices required to provide for structural integrity of openings in building construction.

B. Sealing spaces between sleeves or openings in fire rated and non-fire rated building construction and penetrating piping, ducts, conduits, cables, wiring and like items, except as required in this Section.

C. Providing sleeves and seals for mechanical work penetrating building construction, except as otherwise required, meeting requirements of this Section.

D. Providing sleeves and seals for electrical work penetrating building construction, except as otherwise required, meeting requirements of this Section.

E. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

F. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.3 SUBMITTALS

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

B. Product Data: Submit product specifications, technical data, standard detail drawings, and installation instruction of manufacturer for each sleeve and seal system and products required for each different application. Include published data, certified conformance report or

certified laboratory test report of manufacturer substantiating proposed products meet requirements of Contract Documents.

- C. Shop Drawings: Submit shop drawings for fabrication and installation of each sleeve and seal system required for each different application. Include typical and special details and requirements pertinent to each sleeve and seal condition and application.

1.4 DELIVERY, STORAGE AND MARKING:

- A. Built-In Items: Furnish final reviewed shop drawings, templates and instructions for installation or setting of built-in sleeves and other components.

1.5 PROJECT CONDITIONS

- A. Coordination: Coordinate sleeve and seal work with requirements of work passing through sleeves and of adjacent work, including interface with adjacent construction, and with seals which are provided under other sections of the Specification.

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.

ACI 318.....Building Code Requirements for Reinforced
Concrete, including Commentary, relative to
sleeves embedded in concrete.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

- A. General: Work shall meet design criteria and performance requirements indicated by Contract Documents, including requirements in this Paragraph and in other parts of this Section.
- B. Performance Conditions: Performance of work shall include live loads, creep, shrinkage, deflections, temperature variations, stresses, expansion and contraction requirements, seismic forces, vibration, differential settlement and other like conditions meeting most stringent requirements of Contract Documents and of codes and regulations of public authorities having jurisdiction over the Work.
- C. Assembly Detail: Provide sleeve assembly for each like condition and, when applicable, fire resistance rating of one detail for the entire Work and Project.

D. Sleeve Assembly Fire Resistance:

1. Sleeve and associated firestopping seal, penetration or other work, through or in building construction assembly requiring a fire resistance rating, shall have a fire resistance rating at least equal to rating required for such building construction.
2. Coordinate sleeve with associated firestopping seal, penetration or other work, and adjacent construction, including interface with adjacent construction, to provide and maintain a complete fire resistance rated assembly.

E. Outdoor Sleeves and Seals: Sleeves and seals located in or adjacent to outdoor building construction assemblies shall meet and perform under following requirements:

1. General: Not fail in excess of limitations published by manufacturer and minimize heat gain.
2. Resistance: Resistant to ozone and ultraviolet rays.
3. Compatibility: Compatible with materials to which sleeves and seals will be in contact.

F. Floor Sleeve Heights: Top end of floor sleeves shall extend above top surface of finished floor as follows:

1. General: 4 inches.

2.2 MATERIALS

- A. Steel Plates, Shapes and Bars: ASTM A572 or ASTM A36.
- B. Steel Pipe: ASTM A53, Standard Weight, except as otherwise required.
- C. Hot-Rolled Carbon Steel Sheet: ASTM A570.
- D. Cold-Rolled Carbon Steel Sheet: ASTM A366.
- E. Zinc Coated (Galvanized) Carbon Steel Sheet: ASTM A653, Commercial Quality or Lockforming Quality, as applicable, Coating Designation G90.
- F. Cast Iron Wall Pipe: ANSI C115 and ANSI C151, as applicable, ductile iron.
- G. Concrete Anchor Studs: Cold drawn low carbon steel meeting requirements of ASTM A108, Grade Designation 1020. Finished studs shall meet applicable requirements of AWS D1.1, shall be of types and sizes required for application, and shall have following mechanical properties when evaluated by requirements of ASTM A370.
 1. Tensile Strength: 55,000 psi minimum.
 2. Elongation: 20 percent maximum in 2 inches.
 3. Area Reduction: 50 percent minimum.
- H. Metal Primer Paint: Acrylic rust-inhibitive primer, lead and chromate free, 36 percent minimum solids by volume, 1.17 lbs/gal (140 g/L) maximum VOC unthinned, non-immersion service, eggshell sheen finish.

- I. Bolt Head Expansion Anchors: Carbon steel sleeve anchor with undercutting core type expansion anchor and hexagon head bolt, and listed by EAMI, FMRC and UL. Anchors shall be zinc coated, ASTM B633, Service Condition 2. Diameter and length shall be appropriate for application.
- J. Bedding Sealant: Silicone sealant meeting requirements of Section 07 84 00 - Firestopping.

2.3 FABRICATION

- A. General: Use materials of required types and sizes. Perform work using proven details of fabrication, true to line and level with accurate angles and surfaces, and hairline joints.
- B. Details:
 - 1. Ends and Edges: Ends and edges of sleeves shall be smooth.
 - 2. Existing Penetrations: If sleeve is to be installed after installation of penetration, type of sleeve shall be as required, except detail and fabricate sleeve in two units for installation around penetration. After placing sleeve, joints shall be aligned and continuously welded.
- C. Welding: Weld components meeting requirements of AWS D1.1. Continuously weld joints. Grind welds to be exposed in completed work smooth and uniform with surfaces of parent metal.
- D. Protective Coatings:
 - 1. Required Coatings: After fabrication, provide sleeves with a protective coating as follows:
 - a. General: Sleeves in or adjacent to outdoor construction shall be hot-dip zinc coated and sleeves in other construction shall be prime painted, except as otherwise required.
 - b. Cast Iron Sleeves: Cast iron sleeves do not require a protective coating.
 - 2. Hot-Dip Zinc Coated: Coat surfaces meeting requirements of ASTM A123 or ASTM A153, as applicable.
 - 3. Prime Painted: Prime paint exposed surfaces and initial 2 inches of embedded surfaces. Prepare surfaces meeting requirements of SSPC SP2 or SSPC SP3. Apply metal prime paint meeting requirements of SSPC PA1, except for more stringent requirements of prime paint manufacturer. Paint coat shall be uniform and 2.0 mils minimum dry film thickness.

2.4 SLEEVES

A. Round Sleeves:

1. Existing Concrete-On-Ground Floors: Standard Weight minimum steel pipe unit, fitted over new round opening, of length so bottom end is flush with top surface of adjacent concrete slab and top extends above top surface of finished floor, as specified in Article - Design Criteria, of this Section. Provide unit with integral anchor collar of 1/4 inch minimum steel plate, 2 inches minimum width, located for placement on top of concrete slab, and continuously welded to pipe.
2. Existing Concrete Suspended Floors: Standard Weight minimum steel pipe unit, fitted over new round opening, of length so bottom end is flush with top surface of adjacent concrete slab and top end extends above top surface of finished floor, as specified in Article - Design Criteria, of this Section. Provide unit with integral anchor collar of 1/4 inch minimum thickness steel plate, 2 inches minimum width, located for placement on top of concrete slab, and continuously welded to pipe.
3. New and Existing Walls and Partitions: Provide type sleeve as required for type seal to be used:
 - a. Modular Seals: Standard Weight minimum steel pipe unit of length so each end is flush with respective wall or partition surface. Provide unit with integral and concealed anchor device of type appropriate for wall or partition construction, welded to pipe. Anchor device shall be located at midpoint of wall or partition thickness.
 - b. Sealant or Foam Seals: When sleeve is required, provide pipe sleeve or sheet metal sleeve as follows:
 - 1) Pipe Sleeves: Standard Weight minimum steel pipe unit of length so each end is flush with respective wall or partition surface. Provide unit with integral and concealed anchor device of type appropriate for wall or partition construction, welded to pipe. Anchor device shall be located at midpoint of wall or partition thickness.
 - 2) Sheet Metal Sleeves: Steel sheet of 20 gage minimum, formed to a cylinder profile unit of length so each end is flush with respective wall or partition surface. Provide unit with integral and concealed anchor device of type appropriate for wall or partition construction, welded to sleeve. Anchor device shall be located at midpoint of wall or partition thickness.

B. Rectangular Sleeves:

1. Existing Concrete Suspended Floors: Steel plate or sheet of 1/8 inch minimum thickness, fitted over new opening, of length so bottom end is flush with top surface of adjacent concrete slab or with bottom flange surface of adjacent steel deck, as applicable, and top end extends above top surface of finished floor, as specified in Article - Design Criteria, of this Section. Provide unit with integral anchor collar of 1/4 inch minimum thickness steel plate, 2 inches minimum width, located for placement on top of concrete slab, and continuously welded to sleeve.
2. New and Existing Walls and Partitions: Steel plate or sheet of 16 gage minimum, and of length so each end is flush with respective wall or partition surface. Provide unit with integral and concealed anchor device of type appropriate for wall or partition construction, welded to unit. Anchor device shall be located at midpoint of wall or partition thickness.

C. Accessories:

1. Flashing Flange: Provide sleeves with a flashing clamp flange fitting where adjacent membrane waterproofing is required for building components and termination of waterproofing requires such fitting.
2. Size: Sleeve inside dimensions shall be 1 inch larger in each cross section dimension than outside dimension of penetrating work, including any insulation or covering, except where a greater dimension is required to properly accommodate associated seal.
3. Abandoned Sleeve Closure: Provide 1/4 inch minimum thickness steel plate closure on exterior side of exterior wall sleeves not used in work. Weld plate closure to sleeve, continuous all round.

2.5 SEALS

- A. Firestopping Seals: Seals for use with sleeves or openings through or in building construction assemblies will be provided under Section 07 84 00, FIRESTOPPING, except as otherwise required in this Section.
- B. Modular Seals: Description: Modular mechanical seal consisting of expandable, interlocking synthetic rubber links shaped to continuously fill and seal annular space between penetrating pipe or tube and sleeve or opening. Provide with stainless steel threaded fasteners. Service and size designations of seals shall meet instructions of manufacturer for application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine areas and conditions under which work is to be installed for compliance with requirements of Contract Documents and to determine if conditions affecting performance of work are satisfactory. Do not proceed with installation until unsatisfactory conditions have been resolved. Commencement of installation shall constitute acceptance of conditions.

3.2 INSTALLATION

- A. General: Install work meeting requirements of Contract Documents, as indicated by final reviewed submittals for work, and meeting instructions and recommendations of product manufacturers. Consult with manufacturers for conditions not covered by printed instructions.
- B. Installation: See respective specification section for work in which sleeve is to be installed or set, including requirements for any additional reinforcement required.
- C. Sleeves:
 - 1. General: Install sleeves in correct location, true and plumb. Set and secure sleeves to prevent displacement during subsequent work.
 - 2. After Penetration Installation: When sleeve is installed after penetration is installed, meet applicable requirements specified in Article - Fabrication, of this Section.

3.3 ADJUSTING

- A. Sleeves for Existing Concrete-On-Ground Floors: Sleeve openings through existing concrete-on-ground floors. Remove existing concrete to provide an opening of same dimensions as inside dimensions of sleeve. Set sleeve over opening with anchor collar on top of adjacent concrete slab. Completely bed collar in bedding sealant and secure in place using two minimum bolt head expansion anchors.
- B. Sleeves for Existing Concrete Suspended Floors: Sleeve openings through existing concrete suspended floors. Remove existing concrete to provide an opening of same dimensions as inside dimensions of sleeve. Set sleeve over opening with anchor collar on top of adjacent concrete slab. Completely bed collar in bedding sealant and secure in place using two minimum bolt head expansion anchors.
- C. Floor Sleeve Extension: When height of floor sleeve does not extend above finish floor surface to dimension specified after completion of work in which sleeve is embedded, then extend sleeve height to required dimension as acceptable to Architect.
- D. Abandoned Sleeves:
 - 1. General: Close openings of abandoned sleeves with appropriate type firestopping meeting requirements of Section 07 84 00 - FIRESTOPPING.

3.4 SLEEVE AND SEAL SCHEDULE

A. General:

1. Provide sleeves or openings, as applicable, and seals of respective type for locations indicated in this Schedule. In addition, provide sleeves, openings and seals of appropriate type at locations not specifically scheduled.
2. Provide sleeves or openings, as applicable, to form openings through substructure, floor, roof, wall and partition construction, as applicable, to allow for penetrations of piping, ductwork; electrical conduits, cables and wiring, and like items, except as otherwise required for fire resistance rating, when applicable, or for type of seal to be used to seal annular space between sleeves or openings and penetrations.
3. No sleeve is required to form openings through fire resistance rated walls and partitions to allow for penetrations of penetrating work when fire resistance rating of walls and partitions can be maintained with only a fire resistance rated seal (without use of a sleeve).

B. Existing Concrete-On-Ground Floors:

1. Single Penetration: Pipe sleeve for existing concrete-on-ground floors and modular seal or firestopping seal.

C. Existing Concrete Suspended Floors:

1. Single Penetration: Pipe sleeve for existing concrete suspended floor and firestopping seal.
2. Group Penetration: Rectangular sleeve for existing concrete suspended floor and firestopping seal.

D. New Walls and Partitions:

1. Single Penetrations: Pipe sleeve or sheet metal sleeve for walls and partitions, as applicable, and firestopping seal.
2. Group Penetrations: Rectangular sleeve for walls and partitions and firestopping seal.

E. Existing Interior Walls and Partitions:

1. Single Penetration: Pipe sleeve or sheet metal sleeve for walls and partitions, as applicable, or cored opening with smooth surfaces (no sleeve) and firestopping seal.
2. Group Penetrations: Rectangular sleeve for walls and partitions or opening with smooth surfaces (no sleeve) and firestopping seal.

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**SECTION 07 84 00
FIRESTOPPING**

PART 1 GENERAL

1.1 DESCRIPTION

- A. Closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.
- B. Closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 RELATED WORK

- A. Sleeves and Seals: Section 07 83 50, SLEEVES AND SEALS.
- B. Expansion and Seismic Joint Firestopping: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.
- C. Sealants and Application: Section 07 92 00, JOINT SEALANTS.
- D. Fire and Smoke Damper Assemblies in Ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS, and Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 QUALITY ASSURANCE

- A. FM, UL, or WH or other approved laboratory tested products will be acceptable.

1.4 SUBMITTALS

- A. Submit in accordance with:
 - 1. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.
- C. Provide comprehensive list of all firestopping products installed including each product's installed location.
- C. List of FM, UL, or WH classification number of systems installed.
- D. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

1.5 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.

1.6 WARRANTY

- A. Firestopping work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend the warranty period to five years.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
- E84-07.....Surface Burning Characteristics of Building
Materials
- E119.....Test Methods for Five Tests of Building
Construction and Materials
- E814-06.....Fire Tests of Through-Penetration Fire Stops
- E1399.....Test Method for Cyclic Movement and Measuring
the Minimum and Maximum Joint Widths of
Architectural Joint Systems
- E2174.....Standard for the Inspection of Through
Penetration Firestop Systems
- Proposed Standard for the Inspection of Joint Systems
- Proposed Standard Test Method for Determining the Fire Endurance of
Perimeter Fire Barrier Systems using the
Intermediate Scale, Multi-Story Test Apparatus
- C. BOCA.....National Building Code
- D. FCIA.....Manual of Practice
- E. Factory Mutual Engineering and Research Corporation (FM):
- Annual Issue Approval Guide Building Materials
- F. IEEE 634 - Cable Penetration Firestop Qualification Test.
- G. NFPA 70 - National Electrical Code.
- H. NFPA 101 - Life Safety Code (Code for Safety to Life from Fire in
Buildings and Structures).
- I. NFPA 5000 - Building Construction and Safety Code.
- J. FM 4991.....Approval of Firestop Contractor
- K. Underwriters Laboratories, Inc. (UL):
- Annual Issue Building Materials Directory
- Annual Issue Fire Resistance Directory
- 1479-03.....Fire Tests of Through-Penetration Firestops

2079.....Tests for Fire Resistance of Building Joint
Systems

L. Warnock Hersey (WH):

Annual Issue Certification Listings

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS

- A. Use 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.
- B. Performance Conditions: Performance of work shall include loads, creep, shrinkage, deflections, temperature variations, stresses, expansion and contraction requirements, seismic forces, vibration, differential settlement and other like conditions meeting most stringent requirements of Contract Documents and of codes and regulations of public authorities having jurisdiction over the Work.
- C. System Detail: Provide firestopping system for each like condition and fire resistance rating of one typical detail for the entire Work and Project. Each detail shall be documented by a design assembly as listed by UL or shall be an extrapolation of a design assembly as listed by UL, prepared and certified by UL fire protection engineer for specific condition, application and fire resistance rating and shall meet requirements and be approved by public authorities having jurisdiction over the Work. Extrapolations prepared by fire protection engineer or firestopping manufacturer without certification from UL are not acceptable.
- D. Fire Resistant Systems:
 - 1. Firestopping and associated opening, sleeve, penetration or other work, through or in building construction assemblies requiring a fire resistance rating, shall have a fire resistance rating at least equal to rating required for adjacent building construction.
 - 2. Coordinate firestopping with associated opening, sleeve, penetration or other work, and adjacent construction, including interface with adjacent construction, size of opening to be firestopped and limitations of firestopping, to provide and maintain a complete fire resistance rated assembly.

- E. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 for fire tests and UL 2079, using the Flame "F", Temperature "T", and Air Leakage "L" 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 100 mm (4 in) nominal pipe or 0.01 m² (16 sq. in.) in overall cross sectional area. Flame rating shall be 2 hours minimum, but not less than fire resistance rating of assembly being penetrated. Fire test shall be conducted with a positive air pressure differential of 0.30 inch minimum water column.
- F. Products requiring heat activation to seal an opening by its intumescence shall exhibit a demonstrated ability to function as designed to maintain the fire barrier.
- G. Physical Properties: Firestopping shall be a material, or combination of materials, to maintain integrity of fire rated construction by maintaining an effective barrier against spread of flame, smoke and gases, and meet requirements of ASTM E84, ASTM E119, ASTM E814, UL 1479 and UL 2079, as applicable. Materials shall meet and be acceptable for use by BOCA - National Building Code, ICBO - Uniform Building Code, ICC - International Building Code, NFPA 5000 - Building Construction and Safety Code, SBCCI - Standard Building Code and NER - 243, and shall have following properties:
1. Contain no flammable or toxic solvents.
 2. Have no dangerous or flammable out gassing during the drying or curing of products.
 3. Water-resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
 4. When used in exposed areas, shall be capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.
 5. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84.
 6. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
 7. Materials shall be free of asbestos and carcinogens.

8. Firestopping components shall be compatible with each other, substrates forming openings and items penetrating firestopping under conditions of required service.
 9. Firestopping, after installed and cured, shall not shrink, have void areas, fail in cohesion and lose adhesion to substrates to allow cracks, voids or through openings to form.
 10. Firestopping shall be resistant to moisture and water immersion (submersed in standing water), and shall not re-emulsify or soften when subjected to moisture.
 11. Firestopping components, after curing, shall not emit odor.
 12. Firestopping shall be suitable for firestopping of penetrations made by steel, glass, plastic, insulated pipe, cables, cable trays and like items.
 13. Firestopping shall be flexible and pliable after curing to allow for normal, dynamic and seismic movements of building structure and substrate, expansion and contraction of building assemblies and movement of penetrating objects without cracking, becoming displaced or allowing cracks, voids or through openings to occur.
 14. For insulated pipe, fire rating classification shall not require removal of pipe insulation, except when pipe insulation is combustible and firestopping is not intumescent.
- H. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials shall 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.
 3. Intumescent products which would expand to seal the opening and act as fire, smoke, toxic fumes, and, water sealant.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS

- A. Use silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.
- B. Use mineral fiber filler and bond breaker behind sealant.

- C. Sealants shall have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with E84.
- D. When used in exposed areas capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Submit product data and installation instructions, as required by article, submittals, after an on site examination of areas to receive firestopping.

3.2 PREPARATION

- A. Remove dirt, grease, oil, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.
- B. Remove insulation on insulated pipe for a distance of 150 mm (six inches) on either side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

3.3 INSTALLATION

- A. Do not begin work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.
- B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.
- C. Install smoke stopping seals in smoke partitions.

3.4 CLEAN-UP AND ACCEPTANCE OF WORK

- A. As work on each floor is completed, remove materials, litter, and debris.
- B. Do not move materials and equipment to the next-scheduled work area until completed work is inspected and accepted by the Resident Engineer.
- C. Clean up spills of liquid type materials.

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SECTION 07 91 26
PREFORMED JOINT FILLERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies preformed joint fillers include, but are not limited to, following:
 - 1. Preformed joint fillers.
 - 2. Accessory materials.
- B. Schedule: Required types and applications of preformed joint fillers include, but are not limited to, materials and application locations scheduled in Article - Preformed Joint Filler Schedule, at end of this Section.

1.2 RELATED WORK

- A. Joint fillers associated with firestopping assemblies, and filling joints and openings in fire resistance rated construction assemblies: Section 07 84 00, FIRESTOPPING.
- B. Liquid and premolded sealants for closing and sealing joints or seams: Section 07 92 00, JOINT SEALANTS.
- C. Sealers and fillers associated with mechanical work: Division 23 - Mechanical.
- D. Sealers and fillers associated with electrical work: Division 26 - Electrical.

1.3 DEFINITIONS

- A. Words "premolded joint filler", "joint filler", "filler", "gaskets" and other words of similar meaning shall be synonymous when used in Contract Documents, all such words referring to a filler material for a joint. Refer to Article - Preformed Joint Filler Schedule, at end of this Section.

1.4 PERFORMANCE REQUIREMENTS

- A. Performance: Where required in Article - Preformed Joint Filler Schedule, at end of this Section, preformed joint fillers shall provide airtight, watertight and weathertight continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed preformed joint filler to meet this requirement will be recognized as failures of materials and workmanship.

- B. Performance Conditions: Performance of work shall include loads, creep, shrinkage, deflections, temperature variations, stresses, expansion and contraction requirements, seismic forces, vibration, differential settlement and other like conditions meeting most stringent requirements of Contract Documents and of codes and regulations of public authorities having jurisdiction over the Work.

1.5 QUALITY ASSURANCE

- A1 A. Manufacturer Qualifications: One of acceptable manufacturers for each product specified in Part 2 of this Section who shall have 5 years minimum documented experience in design, detailing, manufacturing and installation of types of preformed joint fillers required for the work.
- B. Installer Qualifications: Installer shall specialize in performing work of this Section and have documented experience in installation and maintenance of type and quality required for work. Installer shall be acceptable to manufacturer and trained in use of materials and equipment to be employed in work, and have successfully completed 5 projects minimum using similar system of similar extent and complexity within the past three (3) years. Installer shall be in business 5 years minimum under same name. Upon request, provide proof of qualifications.

1.6 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SUBMITTALS.
- B. Product Data: Submit product specifications, technical data, standard detail drawings and installation instructions of manufacturer for each product. Include published data, certified conformance report or certified test laboratory report of manufacturer substantiating each proposed product meets requirements of Contract Documents and is intended for application.
- C. Samples: Submit manufacturer standard size samples of each type preformed joint filler.

1.7 PROJECT CONDITIONS

- A. Weather Conditions: Do not proceed with installation of preformed joint fillers under unfavorable weather conditions. Meet instructions and recommendations of preformed joint filler manufacturer.

1.8 WARRANTY

- A. Preformed joint filler work is subject to the terms of the Article "Warranty of Construction" FAR clause 52.246-21, except warranty shall include additional requirements specified in this Article.

B. Time Period: Extend warranty time period to 2 years.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Size and Shape: Provide sizes and shapes of units as indicated on Drawings or, if not indicated on Drawings, as recommended by manufacturer, either in published data or through consultation with a technical representative, for joint size and condition. Where joint movement is a factor in determination of size, consult with Architect to determine nature and magnitude of anticipated joint movements for temperature and condition of project at time of installation.
- B. Compressibility: Specified hardnesses and compressibilities are intended to establish requirements for normal or average conditions of installation and use. Where a range of hardness or compressibility is available for a product, meet recommendations of manufacturer for specific condition of use.
- C. Color: Provide each concealed material in standard color of manufacturer which has best overall performance characteristics for application. Provide exposed materials in black, except where another color is required.
- D. Compatibility: Before purchase of each preformed joint filler material, confirm that such material is compatible with substrate, sealants and other materials in joint system.
- E. Adhesives: Pressure sensitive adhesives, compatible with each material in joint system, may be applied to one face of preformed joint fillers to facilitate installation and permanent anchorage. Do not allow adhesives to contaminate sealant bond surfaces in joint system.

2.2 PREFORMED JOINT FILLERS

- A. Self-Expanding Cork Preformed Joint Filler: Resilient and non-extruding preformed cork made of granulated cork particles bonded together with an insoluble resin binder meeting requirements of ASTM D1752, Type III, and AASHTO M153, Type III, and allows 40 percent expansion and 50 percent compression beyond original thickness.
- B. Cork Preformed Joint Filler: Resilient and non-extruding preformed cork made of granulated cork particles bonded together with a phenolic resin, no bitumen content, meeting requirements of ASTM D1752, Type II, and AASHTO M153, Type II, with 95 percent minimum recovery of original thickness and compatible with hot and cold applied joint sealants.

- C. Sponge Rubber Preformed Joint Filler: Resilient and non-extruding, open cell, preformed synthetic sponge rubber, meeting requirements of ASTM D1752, Type I, and AASHTO M153, Type I, density of 30 to 40 pounds per cubic foot, with 95 percent minimum recovery of original thickness, 25 percent compression deflection at 20 to 35 psi, and 50 percent compression set at 24 hours of 10 percent. Color shall be gray to match concrete as acceptable to Architect.
- D. Synthetic Rubber Preformed Joint Filler: Flexible and expanded, close cell, preformed synthetic rubber meeting requirements of ASTM D1056, Type 2, Grade 2C Series, density of 7 to 35 pounds per cubic foot, Grade 2C1, 25 percent compression deflection at 2 to 5 psi, except provide Grade 2C4, 25 percent compression deflection at 9 to 13 psi, where filler is installed under sealant exposed to traffic, 50 percent compression set at 24 hours of 15 to 25 percent. Color shall be gray to match concrete as acceptable to Architect.
- E. Foam Preformed Joint Filler: Flexible, close cell, preformed synthetic foam meeting requirements of ASTM D5249, Type 2, and ASTM D1752, Sections 5.1 through 5.4, with compression deflection force requirement modified to 10 to 25 psi.
- F. Tongue-and-Groove Preformed Joint Filler Formboard: Preformed shape, prepared for stake-down and insertion of dowel rods, 1-1/2 inch minimum offset thickness and sizes as required for application, meeting applicable requirements of AASHTO T42.

2.3 ACCESSORY MATERIALS

- A. Primer/Sealer: Type of primer/sealer recommended by manufacturer for type of preformed joint filler and surfaces to be primed or sealed.
- B. Adhesives: Type adhesive as recommended by preformed joint filler manufacturer for joint application and shall be compatible with each material in joint system.
- C. Expansion Filler Cap: Metal or plastic cap unit placed on top of preformed joint filler to form straight and uniform void of size to correctly accommodate joint sealant covering preformed joint filler. Cap shall be easily removed after materials adjacent to cap have set or cured, as applicable, without damaging or defacing adjacent materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine joint surfaces to receive preformed joint fillers, and areas and conditions under which work is to be installed for compliance with requirements of Contract Documents and to determine if conditions affecting performance of work are satisfactory. Do not proceed with installation until unsatisfactory conditions have been resolved.
Commencement of installation shall constitute acceptance of conditions.

3.2 JOINT PREPARATION

- A. Cleaning: Clean joint surfaces immediately before installation of preformed joint fillers. Remove dirt, insecure coatings, moisture and other substances which could interfere with installation and seal of preformed joint fillers. Prepare contact surfaces meeting instructions and recommendations of preformed joint filler manufacturer.
- B. Priming and Sealing: Prime or seal joint surfaces where required or recommended by preformed joint filler manufacturer. Confine primer/sealer to contact areas of preformed joint fillers as applicable.
Do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION

- A. General: Install preformed joint fillers meeting requirements of Contract Documents, as indicated by final reviewed submittals for the work and meeting instructions and recommended tolerances and procedures of product manufacturer.
- B. Positioning: Set units at proper depth or position in joint to coordinate with other work, including installation of bond breakers, backer rods and joint sealants. Do not leave voids or gaps between ends of preformed joint filler units and between ends of preformed joint filler units and adjacent construction.
- C. Exposed Edges: Recess exposed edges or faces of exposed joint fillers slightly behind adjoining surfaces, unless otherwise required, so that compressed units will not protrude from joints.
- D. Filler Caps: Remove expansion filler caps from top of preformed joint fillers after materials adjacent to cap have set or cured, as applicable, without damaging or defacing adjacent materials.

3.4 PREFORMED JOINT FILLER SCHEDULE

- A. General: Where Contract Documents do not indicate a specific type joint filler, provide preformed joint filler of respective type for joint location indicated in this Schedule. In addition, provide preformed

joint filler of appropriate type at locations not specifically scheduled as required for condition.

B. Applications: Required applications of preformed joint fillers include, but are not limited to, following locations:

1. Isolation preformed joint fillers between construction elements, except for joints in fire resistance rated construction assemblies, except as otherwise required.
2. Floor construction and expansion preformed joint fillers, except at joints in fire resistance rated construction assemblies and as otherwise required.
3. Outdoor wall component preformed joint fillers, except as otherwise required.
4. Closure stripping in partition construction, except at joints in fire resistance rated construction assemblies.
5. Preformed joint fillers around penetrations of equipment and services through walls, floors and roofs, except as otherwise required.

C. Joints in Cast-In-Place Concrete:

1. Flatwork on Ground:

a. Isolation and Expansion Joints: Joints where preformed joint filler is:

1) Exposed to View in Completed Work (not covered by sealant or finish material): Sponge Rubber Preformed Joint Filler.

2) Not Exposed to View in Completed Work:

a) Hidden or Concealed in Work, except as otherwise required: Self-Expanding Cork, Cork, Sponge Rubber or Foam Preformed Joint Filler.

b) Covered by Sealant: Self-Expanding Cork, Cork, Sponge Rubber, Synthetic Rubber or Foam Preformed Joint Filler, with Expansion Filler Cap.

b. Construction Joints: Joints where key joint forming is to remain permanently in-place: Tongue and Groove Preformed Joint Filler Formboard.

2. Formed Concrete: Joints where preformed joint filler is:

a. Exposed to View in Completed Work (not covered by sealant or finish material): Sponge Rubber Preformed Joint Filler.

b. Not Exposed to View in Completed Work:

1) Hidden or Concealed in Work, except as otherwise described: Self-Expanding Cork, Cork, Sponge Rubber or Foam Preformed Joint Filler.

- 2) Covered by Sealant: Self-Expanding Cork, Cork, Sponge Rubber, Synthetic Rubber or Foam Preformed Joint Filler, with Expansion Filler Cap.

D. Joints in Masonry:

1. Joints Between Structural Members and Unit Masonry: Joints where preformed joint filler is:
 - a. Exposed to View in Completed Work (not covered by sealant or finish material): Sponge Rubber or Foam Preformed Joint Filler.
 - b. Not Exposed to View in Completed Work (hidden, concealed or covered by sealant): Synthetic Rubber or Foam Preformed Joint Filler.
2. Joints Under Relieving Angles:
 - a. Not Exposed to View in Completed Work (hidden, concealed or covered by sealant): Synthetic Rubber or Foam Preformed Joint Filler.

E. Joints in Other Work: Joints where preformed joint filler is:

1. Exposed to View in Completed Work (not covered by sealant or finish material): Sponge Rubber Preformed Joint Filler.
2. Not Exposed to View in Completed Work:
 - a. Hidden or Concealed in Work, except as otherwise required: Sponge Rubber or Synthetic Rubber Preformed Joint Filler, with Expansion Filler Cap when applicable.
 - b. Covered by Sealant: Sponge Rubber or Synthetic Rubber Preformed Joint Filler, with Expansion Filler Cap when applicable.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK

- A. Firestopping penetrations: Section 07 84 00, FIRESTOPPING.
- B. Glazing: Section 08 80 00, GLAZING.
- C. Sound rated gypsum partitions/sound sealants: Section 09 29 00, GYPSUM BOARD.
- D. Mechanical Work: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION, Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, Section 23 05 11, and COMMON WORK RESULTS FOR HVAC.

1.3 QUALITY CONTROL

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
 - 3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.

4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
 5. Test Results: Sealant manufacturer shall issue a compliance certificate for materials tested covering compatibility, adhesion and non-staining of sealant materials to substrates, verify joint preparation procedures, and verifying other physical requirements of sealant as applicable. Certificate shall be accompanied by actual test samples, if applicable.
- D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates in accordance with sealant manufacturer's recommendations:
1. Locate test joints where indicated or, if not indicated, as directed by Contracting Officer.
 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - b. Each type of non-elastomeric sealant and joint substrate indicated.
 3. Notify Contracting Officer's Technical Representative seven days in advance of dates and times when test joints will be erected.
 4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
- E. VOC: Acrylic latex and Silicone sealants shall have less than 50g/l VOC content.
- F. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:
1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this section.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's installation instructions for each product used.
- C. Cured samples of exposed sealants for each color where required to match adjacent material.
- D. Manufacturer's Literature and Data:
 1. Caulking compound.

2. Primers.
3. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

1.5 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not proceed with installation of joint sealants under following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 °C (40 °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.

1.6 DELIVERY, HANDLING, AND STORAGE

- A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.
- B. Carefully handle and store to prevent inclusion of foreign materials.
- C. Do not subject to sustained temperatures exceeding 5° C (40° F) or less than 32° C (90° F).

1.7 DEFINITIONS

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Back-up Rod: A type of sealant backing.
- C. Bond Breakers: A type of sealant backing.
- D. Filler: A sealant backing used behind a back-up rod.

1.8 WARRANTY

- A. Warranty exterior sealing against leaks, adhesion, and cohesive failure, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to two years.

- B. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

1.9 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
- C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material.
- C612-04.....Mineral Fiber Block and Board Thermal Insulation.
- C717-07.....Standard Terminology of Building Seals and Sealants.
- C834-05.....Latex Sealants.
- C919-02.....Use of Sealants in Acoustical Applications.
- C920-05.....Elastomeric Joint Sealants.
- C1021-08.....Laboratories Engaged in Testing of Building Sealants.
- C1193-05.....Standard Guide for Use of Joint Sealants.
- C1330-02 (R2007).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
- D1056-07.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
- E84-08.....Surface Burning Characteristics of Building Materials.
- C. Sealant, Waterproofing and Restoration Institute (SWRI).
The Professionals' Guide

PART 2 - PRODUCTS

2.1 SEALANTS

- A. S-1 - Multi-Component Polyurethane, Vertical Surfaces:
1. ASTM C920, multi-component polyurethane for vertical surfaces.
 2. Type M.
 3. Class 25, joint movement range of plus or minus 50 percent minimum.

4. Grade NS.
 5. Shore A hardness of 20-40
- B. S-2 - Multi-Component Polyurethane, Horizontal Surfaces:
1. ASTM C920, multi-component polyurethane for horizontal surfaces.
 2. Type M.
 3. Class 25.
 4. Grade P.
 5. Shore A hardness of 25-40.
- C. S-3 - Building Silicone:
1. ASTM C920, silicone, neutral cure, non-staining.
 2. Type S.
 3. Class: Joint movement range of plus 50 percent to minus 50 percent.
 4. Grade NS.
 5. Shore A hardness of 15-20.
 6. Minimum elongation of 1200 percent.
- D. S-4 - Structural Silicone:
1. ASTM C920, silicone, neutral cure.
 2. Type S.
 3. Class 25.
 4. Grade NS.
 5. Shore A hardness of 25-30.
 6. Structural glazing application.
- E. S-5 - Mildew Resistance Silicone:
1. ASTM C920 silicone.
 2. Type S.
 3. Class 25.
 4. Grade NS.
 5. Shore A hardness of 25-30.
 6. Non-yellowing, mildew resistant.
- F. S-6 - Acoustical Sealant:
1. ASTM C834 and ASTM C1919; synthetic one component, rubber base sealant.
 2. Permanently flexible, non-drying, non-hardening, non-staining, non-shrinking, non-skinning, and non-migrating.
 3. Effective in reducing airborne sound transmission when tested meeting requirements of ASTM E90.

4. Shall be recommended by manufacturer for exposure condition and application, including interior concealed joints to reduce transmission of airborne sound.
5. Provide sealant for concealed and exposed (painted) applications as applicable.

G. S-7 - Epoxy Joint Filler:

1. Semi-rigid, pour grade, multi-component 100 percent epoxy resin joint filler for concrete floors, requiring no primer, unless otherwise recommended by manufacturer; concrete gray color, and meeting floor joint filler guidelines of ACI 302.1R and ACI 360R. Filler shall be recommended by manufacturer for each exposure condition and application. When cured, filler shall meet following:
 - a. Hardness: Shore A of 90 at 70 degrees Fahrenheit minimum when evaluated meeting requirements of ASTM D2240.
 - b. Tensile Strength: 500 psi minimum when evaluated meeting requirements of ASTM D638.
 - c. Tensile Elongation: 20 percent minimum at 70 degrees Fahrenheit when evaluated meeting requirements of ASTM D638.
 - d. Adhesion: 285 psi minimum when evaluated meeting requirements of ASTM D4541.
 - e. Compressive Yield: 1,530 psi minimum at 57 percent deformation when evaluated meeting requirements of ASTM D695.

2.2 CAULKING COMPOUND

- A. C-1: ASTM C834, acrylic latex.
- B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

2.3 COLOR

- A. Sealants used with exposed masonry shall match color of mortar joints.
- B. Sealants used with unpainted concrete shall match color of adjacent concrete.
- C. Color of sealants for other locations shall be light gray or aluminum, unless specified otherwise.
- D. Caulking shall be light gray or white, unless specified otherwise.

2.4 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, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32° C (minus 26° F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 FILLER

- A. Mineral fiber board: ASTM C612, 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 POURIOUS SURFACES

- A. Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.

- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS

- A. Prepare joints in accordance with manufacturer's instructions and SWRI.
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.
 - 1. Apply primer prior to installation of back-up rod or bond breaker tape.
 - 2. Use brush or other approved means that will reach all parts of joints.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

3.3 BACKING INSTALLATION

- A. Install back-up material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.
- D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.
- E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

3.4 SEALANT DEPTHS AND GEOMETRY

- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
- B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION

- A. General:
 - 1. Apply sealants and caulking only when ambient temperature is between 5° C and 38° C (40° and 100° F).
 - 2. Do not use sealant type listed by manufacture as not suitable for use in locations specified.
 - 3. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
 - 4. Avoid dropping or smearing compound on adjacent surfaces.
 - 5. Fill joints solidly with compound and finish compound smooth.
 - 6. Tool joints to concave surface unless shown or specified otherwise.

7. Finish paving or floor joints flush unless joint is otherwise detailed.
8. Apply compounds with nozzle size to fit joint width.
9. Test sealants for compatibility with each other and substrate. Use only compatible sealant.
- B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.
- C. Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
 1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
 2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
 3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
 4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
 5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as recommended by sealant manufacturer:
 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for first 300 m (1000 feet) of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 300 m (1000 feet) of joint length thereafter or one test per each floor per elevation.
- B. 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.

- C. Inspect tested joints and report on following:
 - 1. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
 - 2. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - 3. Whether sealants filled joint cavities and are free from voids.
 - 4. Whether sealant dimensions and configurations comply with specified requirements.
- D. 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.
- E. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- F. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.7 CLEANING

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by the caulking or sealant manufacturer.
- B. After filling and finishing joints, remove masking tape.
- C. Leave adjacent surfaces in a clean and unstained condition.

3.8 LOCATIONS

- A. Exterior Building Joints, Horizontal and Vertical:
 - 1. Metal to Metal: Type S-3.
 - 2. Metal to Masonry or Stone: Type S-3.
 - 3. Masonry to Masonry or Stone: Type S-1 and S-2.
 - 4. Stone to Stone: Type S-1 and S-2.
 - 5. Threshold Setting Bed: Type S-2.

- 6. Masonry Expansion and Control Joints: Type S-1 and S-2.
- 7. Wood to Masonry: Type S-1 and S-2.
- B. Metal Reglets and Flashings:
 - 1. Flashings to Wall: Type S-3.
 - 2. Metal to Metal: Type S-3.
- C. Sanitary Joints:
 - 1. Walls to Plumbing Fixtures: Type S-5.
 - 2. Counter Tops to Walls: Type S-5.
 - 3. Pipe Penetrations: Type S-5.
- D. Horizontal Traffic Joints:
 - 1. Typical:
 - a. Subject to Traffic: Type S-2.
 - b. Not Subject to Traffic: Type S-2.
 - 2. Concrete Floor and Like Flatwork Construction Joints and Control Joints: Filler of type as indicated for space:
 - a. Equipment Rooms: Type S-7.
 - b. Storage Spaces: Type S-7.
 - c. Subfloors to be Covered with Floor Finish System, except where Filler or Sealant is Integral Part of Floor Finish System: Type S-7.
 - d. Spaces Subject to Manual or Power Operated Vehicle Traffic: Type S-7.
- E. High Temperature Joints over 204 degrees C (400 degrees F):
 - 1. Exhaust Pipes, Flues, Breech Stacks: Type S-4.
- F. Interior Building Joints:
 - 1. Typical Narrow Joint 6 mm, (1/4 inch) or less at Walls and Adjacent Components: Types C-1 and C-2.
 - 2. Perimeter of Doors, Windows, Access Panels which Adjoin Concrete or Masonry Surfaces: Types S-1 and S-2.
 - 3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types S-1 and S-2.
 - 4. Tile:
 - a. General: Types S-1 and S-2.
 - b. Shower and Wet Areas: Type S-5.
 - 4. Isolation Joints at Top of Full Height Walls: Types S-6.
 - 5. Acoustical Joint at Sound Rated Partitions: Type S-6.

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SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section specifies floor, wall and ceiling seismic and exterior building expansion joint assemblies.
- B. Types of assemblies:
 - 1. Metal plate covers.
 - 2. Semi-rigid vinyl joint inserts for ceilings and soffits.

1.2 QUALITY ASSURANCE

- A. Project Conditions:
 - 1. Check actual locations of walls and other construction, to which work must fit, by accurate field measurements before fabrication.
 - 2. Show recorded measurements on final shop drawings.
- B. Fire tests performed by Factory Mutual, Underwriters Laboratories, Inc., Warnock Hersey or other approved independent testing laboratory.

1.3 DELIVERY STORAGE AND HANDLING

- A. Take care in handling of materials so as not to injure finished surface and components.
- B. Store materials under cover in a dry and clean location off the ground.
- C. Remove materials which are damaged or otherwise not suitable for installation from job site and replace with acceptable materials.

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. Submit copies of manufacturer's current literature and data for each item specified.
 - 2. Clearly indicate movement capability of cover assemblies and suitability of material used in exterior seals for ultraviolet exposure.

C. Certificates: Material test reports from approved independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements specified.

D. Shop Drawings:

1. Showing full extent of expansion joint cover assemblies; include large-scale details indicating profiles of each type of expansion joint cover assembly, splice joints between sections, joiners with other type assemblies, special end conditions, anchorages, fasteners, and relationship to adjoining work and finishes.
2. Include description of materials and finishes and installation instructions.

E. Samples:

1. Samples of each type and color of metal finish on metal of same thickness and alloy used in work.
2. Samples of each type and color of flexible seal used in work.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed form part of this specification to extent referenced. Publications are referred to in text by basic designation only.

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

A167-99 (R2004).....Stainless and Heat-Resisting Chromium-Nickel
Steel Plate, Sheet, and Strip

B209M-06.....Aluminum and Aluminum-Alloy Sheet and Plate
(Metric)

B221M-06.....Aluminum and Aluminum-Alloy Extruded Bars,
Rods, Wire, Shapes, and Tubes (Metric)

C920-05.....Elastomeric Joint Sealants

D1187-97 (R2002).....Asphalt Base Emulsions for Use as Protective
Coatings for Metal

D2287-96 (R2001).....Non-rigid Vinyl Chloride Polymer and Copolymer
Molding and Extrusion Compounds

E119-07.....Fire Tests of Building Construction and
Materials

E814-06.....Fire Tests of Through-Penetration Fire Stops

C. Federal Specifications (Fed. Spec):

TT-P-645B.....Primer, Paint, Zinc-Molybdate, Alkyd Type

- D. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual.
- E. National Fire Protection Association (NFPA):
251-05.....Tests of Fire Endurance of Building
Construction and Materials
- F. Underwriters Laboratories Inc. (UL):
263-03.....Fire Tests of Building Construction and
Materials

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A167, Type 302 or 304.
- B. Aluminum:
 - 1. Extruded: ASTM B221, alloy 6063-T5.
 - 2. Plate and Sheet: ASTM B209, alloy 6061-T6.
- C. Fire Barrier:
 - 1. Designed for indicated or required dynamic structural movement without material degradation or fatigue.
 - 2. Tested in maximum joint width condition as a component of an expansion joint cover assembly in accordance with UL 263 NFPA 251, or ASTM E119 and E814, including hose steam test at full-rated period.
- D. Vinyl Insert: Semi-rigid, of manufacturer's standard shapes and grade, as required to span joint width without sagging.
- E. Zinc-Molybdate Primer: Fed. Spec. TT-P-645.
- F. Accessories:
 - 1. Manufacturer's standard anchors, fasteners, set screws, spaces, flexible secondary water stops or seals and filler materials, drain tubes, joint sealants, adhesive and other accessories as indicated or required for complete installations.
 - 2. Compatible with materials in contact.

2.2 FABRICATION

A. General:

1. Use ceiling and wall expansion joint cover assemblies of same design as floor to wall and floor to floor expansion joint cover assemblies. Unless shown otherwise.
2. Provide expansion joint cover assemblies of design, basic profile, materials and operation indicated required to accommodate joint size variations in adjacent surfaces, and as required for anticipated structural movement.
3. Seismic Forces: Expansion cover assemblies shall be capable of withstanding anticipated multi-directional seismic forces without failure or stress to components.
4. Material: Use stainless steel for seismic joints and joints 100mm (4 inches) and greater.
5. Deliver to job site ready for use and fabricated in as large sections and assemblies as practical. Assemblies identical to submitted and reviewed shop drawings, samples and certificates.
6. Furnish units in longest practicable lengths to minimize number of end joints. Provide mitered corners where joint changes directions or abuts other materials.
7. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections and other assemblies.
8. Fire Performance Characteristics:
 - a. Provide expansion joint cover assemblies identical to those of assemblies whose fire resistance has been determined per ASTM E119 and E814, NFPA 251, or UL 263 including hose stream test at full-rated period.
 - b. Fire rating: Not less than rating of adjacent floor or wall construction.
9. Fire Barrier Systems:
 - a. Material to carry label of approved independent testing laboratory, and be subject to follow-up system for quality assurance.
 - b. Include thermal insulation where necessary, in accordance with above tests, with factory cut miters and transitions.

- c. For joint widths up to and including 150 mm (six inches), supply barrier in lengths up to 15000 mm (50 feet) to eliminate field splicing.
 - d. For joints within enclosed spaces such as chase walls, include 1 mm (0.032-inch) thick galvanized steel cover where conventional expansion joint cover is not used.
- 10. Seal Strip factory - formed and bonded to metal frames and anchor members.
- B. Floor-to-Floor Metal Plate Joints:
 - 1. Frames on each side of joint designed to support cover plate of design shown.
 - a. Continuous frame designed to finish flush with adjacent floor of profile indicated with seating surface and raised floor rim to accommodate flooring.
 - b. Provide concealed bolt and steel anchors for embedment in concrete.
 - c. Designed for filler materials between raised rim of frame and edge of cover plate where shown.
 - d. Frame and cover plates of some metal where exposed.
 - 1) Design cover plates to support 180 Kg (400 lbs) per 0.3 square meters (1-square foot).
 - 2) Cover plates free of rattle due to traffic.
 - 3) No gaps or budes occur on filler material during design movement of joint.
 - 4) Provide manufacturer's continuous standard flexible vinyl water stop under floor joint cover assemblies.
- C. Floor-to-Wall Metal Plate Joints:
 - 1. Provide one frame on floor side of joint only. Provide wall side frame where required by manufacturer's design.
 - 2. Angle Cover Plates: Provide angle cover plates for joints to wall with countersunk flat-head exposed fasteners for securing to wall unless shown otherwise.
 - 3. Space fasteners as recommended by manufacturer.
 - 4. Match cover of adjacent floor to floor cover.
- D. Interior Wall Joint Cover Assemblies:
 - 1. Surface Mounted Metal Cover Plates:
 - a. Concealed frame for fastening to wall on one sides of joint.

- b. Extend cover to lap each side of joint and to permit free movement on one side.
 - c. Provide concealed attachment of cover to frame cover in close contact with adjacent finish wall surfaces.
 - d. Use angle cover plates at intersection of walls.
 - e. Use smooth surface cover plates matching floor plates.
 - f. Use expansion fire inserts in fire rated walls, rated same as hour rating of wall.
- E. Ceiling and Soffit Assemblies:
- 1. Variable movement vinyl insert in metal frame on both sides of joint.
 - 2. Designed for flush mounting with no exposed fasteners.
 - 3. Vinyl insert locked into metal frame.
 - 4. Vinyl insert semi rigid either flush face or accordion shape as showed to span joint width without sagging.

2.3 METAL FINISHES

A. General:

- 1. Apply finishes in factory after products are fabricated.
- 2. Protect finishes on exposed surfaces with protective covering before shipment.

B. Aluminum Finishes:

- 1. Finish letters and numbers for anodized aluminum are in accordance with the NAAMM AMP 501, Aluminum Association's Designation System).
 - a. Clear anodized finish: AA-C22A41 Chemically etched medium matte, clear anodic coating, Class I Architectural, 0.7 - mil thick.
- 2. Factory-Primed Concealed Surface: NAAMM AMP 505 Protect concealed aluminum surfaces that will be in contact with plaster, concrete or masonry surfaces when installed by applying a shop coat of zinc-molybdate primer to contact surfaces. Provide minimum dry film thickness of 2.0 mils.

C. Stainless Steel: NAAMM AMP 503, finish No. 2B.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Manufacturer's representative shall make a thorough examination of surfaces receiving work of this section.

- B. Before starting installation, notify prime contractor of defects which would affect satisfactory completion of work.

3.2 PREPARATION

- A. Verify measurements and dimensions at job site and cooperate in coordination and scheduling of work with work of related trades.
- B. Give particular attention to installation of items embedded in concrete and masonry so as not to delay job progress.
- C. Provide templates to related trade for location of support and anchorage items.

3.3 INSTALLATION

- A. Install in accordance with manufacturers installation instructions unless specified otherwise.
- B. Provide anchorage devices and fasteners for securing expansion joint assemblies to in-place construction including threaded fasteners with drilled-in fasteners for masonry and concrete where anchoring members are not embedded in concrete. Provide metal fasteners of type and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.
- C. Perform cutting, drilling and fitting required for installation of expansion joint cover assemblies.
- D. Install joint cover assemblies in true alignment and proper relationship to expansion joint opening and adjoining finished surfaces measured from established lines and levels.
- E. Allow for thermal expansion and contraction of metal to avoid buckling.
- F. Set floor covers at elevations flush with adjacent finished floor materials unless shown otherwise.
- G. Material and method of grouting floor frames set in prepared recesses in accordance with manufacturer's instructions.
- H. Locate wall, ceiling and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with required accessories.
- I. Locate anchors at interval recommended by manufacturer, but not less than 75 mm (3-inches) from each ends, and, not more than 600 mm (24-inches) on centers.
- J. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints.

- K. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames or plates.
- L. Flush Metal Cover Plates:
 - 1. Secure flexible filler between frames so that it will compress and expand.
 - 2. Adhere flexible filler materials to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- M. Fire Barriers:
 - 1. Install in compliance with tested assembly.
 - 2. Install in floors and in fire rated walls.
 - 3. Use fire barrier sealant or caulk supplied with system.
- N. Sealants: Install to prevent water and air infiltration

3.4 PROTECTION

- A. Take proper precautions to protect the expansion joint covers from damage after they are in place.
- B. Cover floor joints with plywood where wheel traffic occurs.

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies steel doors, steel frames and related components.
- B. Terms relating to steel doors and frames as defined in ANSI A123.1 and as specified.

1.2 RELATED WORK

- A. Frames fabricated of structural steel: Section 05 50 00, METAL FABRICATIONS.
- B. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Card readers: Section 28 13 00, ACCESS CONTROL.
- D. Division 28: Electronic Safety and Security.

1.3 TESTING

- A. An independent testing laboratory shall perform testing.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers Literature and Data:
 - 1. Fire rated doors and frames, showing conformance with NFPA 80 and Underwriters Laboratory, Inc., or Intertek Testing Services or Factory Mutual fire rating requirements and temperature rise rating for stairwell doors. Submit proof of temperature rating.

1.5 SHIPMENT

- A. Prior to shipment label each door and frame to show location, size, door swing and other pertinent information.
- B. Fasten temporary steel spreaders across the bottom of each door frame.

1.6 STORAGE AND HANDLING

- A. Store doors and frames at the site under cover.
- B. Protect from rust and damage during storage and erection until completion.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

- C. Insulation: Material of type and characteristics required for application which is non-combustible, impervious to fungi and mildew, and of insulating value required for application. Insulation flame spread and smoke developed indexes shall be 25 and 50 maximum, respectively, when evaluated meeting requirements of ASTM E136.
- D. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

2.2 FABRICATION GENERAL

A. General:

1. Follow SDI A250.8 for fabrication of standard steel doors, except as specified otherwise. Doors to receive hardware specified in Section 08 71 00, DOOR HARDWARE. Tolerances as per SDI A250.8. Thickness, 44 mm (1-3/4 inches), unless otherwise shown.
2. 3. When vertical steel stiffeners are used for core construction, fill spaces between stiffeners with mineral fiber insulation.

B. Heavy Duty Doors: SDI A250.8, Level 2, Model 2 of size and design shown. Core construction type shall be f, vertical steel stiffeners.

C. Finish Hardware Preparation: Prepare hollow steel units to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Meet applicable requirements of HMMA 830 and ANSI A115, except as otherwise required by Contract Documents.

1. Reinforce hollow steel units to receive surface applied hardware. Drilling and tapping for surface applied finish hardware may be performed at project site.
2. Locate finish hardware meeting requirements of Section 08 71 00, DOOR HARDWARE.

D. Fire Rated Doors (Labeled):

1. Conform to NFPA 80 when tested by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual for the class of door or door opening shown.
2. Fire rated labels of metal, with raised or incised markings of approving laboratory shall be permanently attached to doors.

3. Close top and vertical edges of doors flush. Vertical edges shall be seamless. Apply steel astragal to the meeting stile of the active leaf of pairs of fire rated doors, except where vertical rod exit devices are specified for both leaves swinging in the same direction.
4. Construct fire rated doors in stairwell enclosures for maximum transmitted temperature rise of 230 °C (450 °F) above ambient temperature at end of 30 minutes of fire exposure when tested in accordance with ASTM E152.

E. Sound Control Doors: Doors to receive seals, gasketing and other sound control hardware as specified in Section 08 71 00, DOOR HARDWARE.

2.3 METAL FRAMES

A. General:

1. SDI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.
2. Frames for labeled fire rated doors and windows.
 - a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual.
 - b. Fire rated labels of approving laboratory permanently attached to frames as evidence of conformance with these requirements. Provide labels of metal or engraved stamp, with raised or incised markings.
3. Frames for doors specified to have automatic door operators; minimum 1.7 mm (0.067 inch) thick.
4. Knocked-down frames are not acceptable.

B. Reinforcement and Covers:

1. SDI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.
2. Provide mortar guards securely fastened to back of hardware reinforcements.

C. Glazed Openings:

- a. Integral stop on corridor, or secure side of door.
- b. Design rabbet width and depth to receive glazing material or panel shown or specified.

D. 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 sub-frames and secured to sub-frame legs with countersunk, flat head screws, spaced 300 mm (12 inches) on center at head and jambs on each side.
- c. Preassemble at factory for alignment.

E. Frame Anchors:

1. Floor anchors:

- a. Where floor fills occur, provide extension type floor anchors to compensate for depth of fill.
- b. At bottom of jamb use 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive two 6 mm (1/4 inch) floor bolts.
- c. Where mullions occur, provide 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two 6 mm (1/4 inch) floor bolts and frame anchor screws.
- d. Where sill sections occur, provide continuous 1 mm (0.042 inch) thick steel rough bucks drilled for 6 mm (1/4 inch) floor bolts and frame anchor screws. Space floor bolts at 50 mm (24 inches) on center.

2. Jamb anchors:

- a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 600 mm (24 inches) apart, except for fire rated frames space anchors as required by labeling authority.
- b. Form jamb anchors of not less than 1 mm (0.042 inch) thick steel unless otherwise specified.
- c. Anchors set in masonry: Use adjustable anchors designed for friction fit against the frame and for extension into the masonry not less than 250 mm (10 inches). Use one of following type:
 - 1) Wire loop type of 5 mm (3/16 inch) diameter wire.
 - 2) T-shape or strap and stirrup type of corrugated or perforated sheet steel.
- d. Anchors for stud partitions: Either weld to frame or use lock-in snap-in type. Provide tabs for securing anchor to the sides of the studs.

- e. Anchors for frames set in prepared openings:
 - 1) Steel pipe spacers with 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.
 - 2) Drill jamb stop and strap spacers for 6 mm (1/4 inch) flat head bolts to pass thru frame and spacers.
 - 3) Two piece frames: Subframe or rough buck drilled for 6 mm (1/4 inch) bolts.
- f. Anchors for observation windows and other continuous frames set in stud partitions.
 - 1) In addition to jamb anchors, weld clip anchors to sills and heads of continuous frames over 1200 mm (4 feet) long.
 - 2) Anchors spaced 600 mm (24 inches) on centers maximum.
- g. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

2.4 TRANSOM PANELS

- A. Fabricate panels as specified for flush doors.
- B. Fabricate bottom edge with rabbet stop to fit top of door where no transom bar occurs.

2.5 LOUVERS

- A. General:
 - 1. Sight proof type with stationary blades the full thickness of the door.
 - 2. Design lightproof louvers to exclude passage of light but permit free ventilation.
- B. Fabrication:
 - 1. Steel louvers 0.8 mm (0.032 inch) thick for interior doors.
 - 2. Fabricate louvers as complete units. Install in prepared cutouts in doors.
 - 3. Weld stationary blades to frames. Weld louvers into door openings.

2.6 SHOP PAINTING

- A. SDI A250.8.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Plumb, align and brace frames securely 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 if the shipping spreader is removed.
3. Protect frame from accidental abuse.
4. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored.
5. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.

B. Floor Anchors:

1. Anchor the bottom of door frames to floor with two 6 mm (1/4 inch) diameter expansion bolts.
2. Power actuated drive pins may be used to secure frame anchors to concrete floors.

C. Jamb Anchors:

1. Coat frame back with a bituminous coating prior to lining of grout filling in masonry walls.
2. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.
3. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 6 mm (1/4 inch) expansion bolts through spacers. Where subframes or rough bucks are used, 6 mm (1/4 inch) expansion bolts on 600 mm (24 inch) centers or power activated drive pins 600 mm (24 inches) on centers. Secure two piece frames to subframe or rough buck with machine screws on both faces.

- D. Install anchors for labeled fire rated doors to provide rating as required.

3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

- A. Install doors and hardware as specified in Sections 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, WOOD DOORS and Section 08 71 00, DOOR HARDWARE.

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**SECTION 08 14 00
INTERIOR WOOD DOORS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior flush doors and stile and rail doors with prefinish, prefit option.
- B. Section includes fire rated doors.

1.2 RELATED WORK

- A. Metal Door Frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
- B. Door Hardware Including Hardware Location (Height): Section 08 71 00, DOOR HARDWARE.
- C. Installation of Doors and Hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, WOOD DOORS, or Section 08 71 00, DOOR HARDWARE.
- D. Glazing: Section 08 80 00, GLAZING.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Meet requirements of AWI Quality Standards, Section 1300 and WDMA IS.1A, except as otherwise indicated by Contract Documents.
- B. Duty Level: Meet requirements of WDMA IS.1A, Extra Heavy Duty.

1.4 SUBMITTALS

- A. Submit in accordance with: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
 - 1. Corner section of flush veneered door 300 mm (12 inches) square, showing details of construction, labeled to show grade and type number and conformance to specified standard.
 - 2. Veneer sample 200 mm (8 inch) by 275 mm (11 inch) by 6 mm (1/4 inch) showing specified wood species sanded to receive a transparent finish. Factory finish veneer sample where the prefinished option is accepted.
- C. Shop Drawings:
 - 1. Show every door in project and schedule location in building.
 - 2. Indicate type, grade, finish and size; include detail of glazing, gasketing and pertinent details.
 - 3. Provide information concerning specific requirements not included in the manufacturer's literature and data submittal.

D. Manufacturer's Literature and Data: Labeled fire rated doors showing conformance with NFPA 80.

E. Laboratory Test Reports:

1. Screw holding capacity test report in accordance with WDMA T.M.10.
2. Split resistance test report in accordance with WDMA T.M.5.
3. Cycle/Slam test report in accordance with WDMA T.M.7.
4. Hinge-Loading test report in accordance with WDMA T.M.8.

1.6 WARRANTY

A. Doors are subject to terms of Article titled "Warranty of Construction", FAR clause 52.246-21, except that warranty shall be as follows:

1. For interior doors, manufacturer's warranty for lifetime of original installation.

1.7 DELIVERY AND STORAGE

- A. Factory seal doors and accessories in minimum of 6 mill polyethylene bags or cardboard packages which shall remain unbroken during delivery and storage.
- B. Store in accordance with WDMA I.S.1-A, J-1 Job Site Information.
- C. Label package for door opening where used.

1.8 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. Window and Door Manufacturers Association (WDMA):

I.S.1-A-04.....Architectural Wood Flush Doors

I.S.4-07A.....Water-Repellent Preservative Non-Pressure
Treatment for Millwork

I.S.6A-01.....Architectural Wood Stile and Rail Doors

T.M.5-90.....Split Resistance Test Method

T.M.6-08.....Adhesive (Glue Bond) Durability Test Method

T.M.7-08.....Cycle-Slam Test Method

T.M.8-08.....Hinge Loading Test Method

T.M.10-08.....Screwholding Test Method

C. National Fire Protection Association (NFPA):

80-07.....Protection of Buildings from Exterior Fire

252-08.....Fire Tests of Door Assemblies

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Eggers Industries, or equal, as acceptable to Owner and Architect.

2.2 FLUSH DOORS

A. General:

1. Meet requirements of WDMA I.S.1-A, Extra Heavy Duty.
2. All wood products shall be urea-formaldehyde free.
3. Adhesive: Type II.
4. Thickness: 45 mm (1-3/4 inches) unless otherwise shown or specified.

B. Face Veneer:

1. Painted Finish: Custom Grade, mill option close grained hardwood, premium or medium density overlay. Do not use Lauan.
2. Factory sand doors for finishing.

C. Wood for stops, louvers, muntins and moldings of flush doors:

1. Solid Wood of same species as face veneer.
2. Glazing:
 - a. On non-labeled doors use applied wood stops nailed tight on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on centers.
 - b. Use stainless steel or dull chrome plated brass screws for exterior doors.
3. Wood Louvers:
 - a. Door manufacturer's standard product, fabricated of solid wood sections.
 - b. Wood Slats: Not less than 5 mm (3/16 inch) thick.
 - c. Stiles routed out to receive slats.
 - d. Secure louvers in prepared cutouts with wood stops.

D. Stiles and Rails:

1. Option for wood stiles and rails:
 - a. Composite material having screw withdrawal force greater than minimum performance level value when tested in accordance with WDMA T.M.10.
2. Provide adequate blocking for bottom of doors having mechanically operated door bottom seal meeting or exceeding the performance duty level per T.M.10 for horizontal door edge screw holding.

E. Fire rated wood doors:

1. Fire Performance Rating:

- a. "B" label, 1-1/2 hours.
- b. "C" label, 3/4 hour.

2. Labels:

- a. Doors shall conform to the requirements of ASTM E2074, or NFPA 252, and, carry an identifying label from a qualified testing and inspection agency for class of door or opening shown designating fire performance rating.
- b. Metal labels with raised or incised markings.

3. Performance Criteria for Stiles of doors utilizing standard mortise leaf hinges:

- a. Hinge Loading: WDMA T.M.8. Average of 10 test samples for Extra Heavy Duty doors.
- b. Direct screw withdrawal: WDMA T.M.10 for Extra Heavy Duty doors. Average of 10 test samples using a steel, fully threaded #12 wood screw.
- c. Cycle Slam: 1,000,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with WDMA T.M.7.

4. Additional Hardware Reinforcement:

- a. Provide fire rated doors with hardware reinforcement blocking.
- b. Size of lock blocks as required to secure hardware specified.
- c. Top, bottom and intermediate rail blocks shall measure not less than 125 mm (five inches) minimum by full core width.
- d. Reinforcement blocking in compliance with manufacturer's labeling requirements.
- e. Mineral material similar to core is not acceptable.

5. Other Core Components: Manufacturer's standard as allowed by the labeling requirements.

6. Provide steel frame approved for use in labeled doors for vision panels.

7. Provide steel astragal on pair of doors.

F. Smoke Barrier Doors:

- 1. For glazed openings use steel frames approved for use in labeled doors.

2. Provide a steel astragal on one leaf of pairs of doors, including double egress doors.

G. Sound Control Doors: Doors to receive seals, gasketing and other sound control hardware as specified in Section 08 71 00, DOOR HARDWARE.

2.3 STILE AND RAIL DOORS

A. Meeting requirements of WDMA IS 6A.

B. Ponderosa pine doors of size and design shown.

C. All wood products shall be urea-formaldehyde free.

D. Grade: Premium.

E. Veneer: Same specified for flush wood doors.

F. Door Panels:

1. Grain of face of panels parallel with longest dimensions of panel.

2. Flat panels: Veneered composite core, not less than 6 mm (5/8 inch) thick.

3. Raised panels: Unless otherwise shown, thickness of raised panels not less than the following:

a. For 35 mm (1-3/8 inch) and 45 mm (1-3/4 inch) thick doors: 28 mm (1-1/8 inch) thick

b. For 57 mm (2-1/4 inch) thick doors: 41 mm (1-5/8 inch) thick

4. Where armor plate is required in connection with paneled doors, provide panels with plywood fillers, glued in place, and finished.

G. Stops and Molds:

1. Solid sticking both sides, of same material as stiles and rails, coped at intersections.

2. Glazed openings applied wood stops nailed on interior side of door.

2.4 PREFINISH, PREFIT OPTION

A. Wood doors shall be factory machined to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.

B. Factory fitting to conform to specification for shop and field fitting, including factory application of sealer to edge and routings.

C. Prefinishing:

1. General: Prime finish wood doors at factory or finish shop.

2. Standards: Meet requirements of AWI Quality Standards, Sections 1300, 1400 and 1500, as applicable for respective finish and quality grade required.

- D. Opaque Paint Finish - Primed Only: AWI Quality Standards, Finish System OP-6 - Opaque Catalyzed Polyurethane, primer only (water emulsion), Premium Grade, open grain wood finish, non-filled, and closed grain wood finish, as defined by AWI Quality Standards. Finish shall be capable of being finish painted at project site without visual effect as acceptable to Architect.

2.5 IDENTIFICATION MARK

- A. On top edge of door.
- B. Either a stamp, brand or other indelible mark, giving manufacturer's name, door's trade name, construction of door, code date of manufacture and quality.
- C. Accompanied by either of the following additional requirements:
 - 1. An identification mark or a separate certification including name of inspection organization.
 - 2. Identification of standards for door, including glue type.
 - 3. Identification of veneer and quality certification.
 - 4. Identification of preservative treatment for stile and rail doors.

2.5 SEALING

- A. Give top and bottom edge of doors two coats of catalyzed polyurethane or water resistant sealer before sealing in shipping containers.

PART 3 - EXECUTION

3.1 DOOR PREPARATION

- A. Field, shop or factory preparation: Do not violate the qualified testing and inspection agency label requirements for fire rated doors.
- B. Clearances between Doors and Frames and Floors: Maximum 3 mm (1/8 inch) clearance at the jambs, heads, and meeting stiles, and a 19 mm (3/4 inch) clearance at bottom, except as otherwise specified.
- C. Provide cutouts for special details required and specified.
- D. Rout doors for hardware using templates and location heights specified in Section, 08 71 00 DOOR HARDWARE.
- E. Fit doors to frame, bevel lock edge of doors 3 mm (1/8 inch) for each 50 mm (two inches) of door thickness undercut where shown.
- F. Immediately after fitting and cutting of doors for hardware, seal cut edges of doors with two coats of water resistant sealer.
- G. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.

- H. Apply a steel astragal on the opposite side of active door on pairs of fire rated doors.
- I. Apply a steel astragal to meeting style of active leaf of pair of doors or double egress smoke doors.

3.2 INSTALLATION OF DOORS APPLICATION OF HARDWARE

- A. Install doors and hardware as specified in this Section.

3.3 DOOR PROTECTION

- A. As door installation is completed, place polyethylene bag or cardboard shipping container over door and tape in place.
- B. Provide protective covering over knobs and handles in addition to covering door.
- C. Maintain covering in good condition until removal is approved by Contracting Officer's Technical Representative.

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section specifies access doors or panels.

1.2 RELATED WORK

- A. Access doors in acoustical ceilings: Section 09 51 00, ACOUSTICAL
CEILINGS.
- B. Locations of access doors for duct work cleanouts: Section 23 31 00,
HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.
- C. Lock Cylinders: Section 08 71 00, DOOR HARDWARE.

1.3 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 23, SHOP DRAWINGS,
PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Access doors, each type, showing construction, location
and installation details.
- C. Manufacturer's Literature and Data: Access doors, each type.

1.5 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 Society for Testing and Materials (ASTM):
- A167-99(R-2004).....Stainless and Heat-Resisting Chromium-Nickel
Steel Plate, Sheet and Strip
- A1008-07.....Steel Sheet, Cold-Rolled, Carbon, Structural,
High Strength Low-Alloy
- C. American Welding Society (AWS):
- D1.3-98.....Structural Welding Code Sheet Steel
- D. National Fire Protection Association (NFPA):
- 80-06.....Fire Doors and Windows
- E. The National Association of Architectural Metal Manufacturers (NAAMM):
- AMP 500 Series.....Metal Finishes Manual
- F. Underwriters Laboratories, Inc. (UL):
- Fire Resistance Directory

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. General: Provide access doors of carbon steel, except provide access doors of stainless steel when located in wet areas such as toilet rooms, food service areas or outdoor walls, or with ceramic tile surfaces.
- B. Carbon Steel: ASTM A366, cold rolled, rolled leveled.
- C. Stainless Steel: ASTM A167 or ASTM A240, Type 304, cold rolled.
- D. Aluminum: Extruded aluminum.

2.2 FABRICATION - GENERAL

- A. Fabricate components to be straight, square, flat and in same plane where required.
 - 1. Slightly round exposed edges and without burrs, snags and sharp edges.
 - 2. Exposed welds continuous and ground smooth.
 - 3. Weld in accordance with AWS D1.3.
- B. Number of locks and non-continuous hinges as required to maintain alignment of panel with frame. For fire rated doors, use hinges and locks as required by fire test.
- C. Provide anchors or make provisions in frame for anchoring to adjacent construction. Provide size, number and location of anchors on four sides to secure access door in opening. Provide anchors as required by fire test.

2.3 ACCESS DOORS - FIRE RATED

- A. Shall meet requirements for "B" label 1-1/2 hours with maximum temperature rise of 120 degree C (250 degrees F).
- B. Comply with NFPA 80 and have Underwriters Laboratories Inc., or other nationally recognized laboratory label for Class B opening.
- C. Door Panel: Form of 0.9 mm (0.0359 inch) thick steel or stainless steel sheet, insulated sandwich type construction.
- D. Frame: Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed. Provide frame flange at perimeter where installed in concrete masonry or gypsum board openings.
 - 1. Weld exposed joints in flange and grind smooth.
 - 2. Provide frame flange at perimeter where installed in concrete masonry or gypsum board.

E. Automatic Closing Device: Provide automatic closing device for door.

F. Hinge: Continuous steel hinge with stainless steel pin.

G. Lock:

1. Provide self-latching lock with provision for fitting flush a standard screw in type lock cylinder. Lock cylinder shall be as specified in Section 08 71 00, DOOR HARDWARE.
2. Provide latch release device operable from inside of door. Mortise case in door.

2.4 ACCESS DOORS - NON-RATED

A. Flush Panel Doors:

1. Form of 1.9 mm (0.0747 inch) thick carbon steel or 1.5 mm (0.0598 inch) thick stainless steel sheet.
2. Reinforce to maintain flat surface.

B. Recessed Panels Doors:

1. Fabricate solid panel doors from 18 gage minimum carbon steel sheet or 0.0480 inch minimum thickness stainless steel.
2. Face of panel shall be recessed below surface of applied finish, with pan of depth as required for applicable finish material, such as tile or gypsum board, to be inserted in panel. Reinforce panel as required to support materials and to prevent buckling.

C. Frame:

1. Form of 1.5 mm (0.0598 inch) thick carbon steel or stainless steel sheet of depth and configuration to suit material and type of construction where installed.
2. Weld exposed joints in flange and grind smooth.
3. Flanged Frame: Provide surface mounted units having frame flange at perimeter where installed in concrete, masonry, or gypsum board construction.
4. Flangeless Frame: Flangeless framed access doors shall have a concealed frame with integral casing beads or edge terminations at adjacent or surrounding surface materials and finishes.
 - a. For gypsum board construction, provide hot-dip zinc coated steel gypsum board corner casing beads of type to be concealed with gypsum board jointing compound, welded to perimeter of frame.
 - b. For ceramic tile finish, provide with a metal edge to terminate ceramic tile, welded to perimeter of frame.

D. Hinge:

1. Concealed spring hinge to allow panel to open 175 degrees.
2. Provide removable hinge pin to allow removal of panel from frame.

E. Lock: Provide flush screwdriver operated cam lock.

2.5 FINISH

- A. Provide in accordance with NAAMM AMP 500 series on exposed surfaces.
- B. Carbon Steel Surfaces: Baked-on prime coat over a protective phosphate coating.
- C. Stainless Steel: No. 4 for exposed surfaces at toilet and restroom locations.
- D. Aluminum: Mill finish for concealed surfaces.

2.6 SIZE

- A. General: Minimum 600 mm (24 inches) square door unless otherwise shown or required to suit opening in suspension system of ceiling.

PART 3 - EXECUTION

3.1 LOCATION

- A. Provide access panels or doors wherever any valves, traps, dampers, cleanouts, and other control items of mechanical, electrical and conveyor work are concealed in wall or partition, or are above ceiling of gypsum board.
- B. Use fire rated doors in fire rated partitions and ceilings.
- C. Unless otherwise indicated by Contract Documents, use recessed panel doors in partitions and gypsum board ceilings, except lay-in acoustical panel ceilings or upward access acoustical tile ceilings.

3.2 INSTALLATION - GENERAL

- A. Install access doors in openings to have sides vertical in wall installations, and parallel to ceiling suspension grid or side walls when installed in ceiling.
- B. Set frames so that edge of frames without flanges will finish flush with surrounding finish surfaces.
- C. Set frames with flanges to overlap opening and so that face will be uniformly spaced from the finish surface.
- D. Set recessed panel access doors recessed so that face of surrounding materials will finish on the same plane, when finish in door is installed.

3.3 ANCHORAGE

- A. Secure frames to adjacent construction using anchors attached to frames or by use of bolts or screws through the frame members.
- B. Type, size and number of anchoring device suitable for the material surrounding the opening, maintain alignment, and resist displacement during normal use of access door.
- C. Anchors for fire rated access doors shall meet requirements of applicable fire test.

3.4 ADJUSTMENT

- A. Adjust hardware so that door panel will open freely.
- B. Adjust door when closed so door panel is centered in the frame.

- - - E N D - - -

**SECTION 08 33 13
COILING COUNTER DOORS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section specifies overhead roll up coiling shutters over counter in walls, including frame.
- B. Motor operation.

1.2 RELATED WORK

- A. Metal Fabrication: Section 05 50 00
- B. Rough Carpentry: Section 06 10 00
- C. Field Painting: Section 09 91 00, PAINTING.
- D. Access Panels & Doors: Section 08 31 00
- E. Electrical: Division 26

1.3 SUBMITTALS

- A. Procedures: Furnish submittals in accordance with the general requirements specified.
- B. Manufacturer's Literature and Data:
 - 1. Submit manufacturer's technical literature describing the product to be used under this section.
 - 2. Shutter, each type.
 - 3. Installation procedures and instructions.
- C. Shop Drawings:
 - 1. Shutter, each type, showing details of construction and installation.
 - 2. Furnish shop drawings for architect's approval. Include elevations, sections, and details indicating dimensions, materials, finishes, conditions for anchorage and support of each shutter.
- D. Certifications: Submit manufacturer's Underwriters Laboratories (UL), Warnock Hersey (WH) or Factory Mutual Research (FM) laboratory test report verifying product compliance in accordance with the required fire and smoke ratings.
- E. Maintenance and Operating Manuals: Furnish complete manuals describing the materials, devices and procedures to be followed in operating and maintaining all shutters under this section. Include manufacturer's brochures and parts lists describing the actual materials used in the product.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
- A47-99(R2009).....Malleable Iron Castings
 - A48-03(R2008).....Gray Iron Castings
 - A53-10.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated
Welded and Seamless
 - A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel
Steel Plate, Sheet and Strip
 - A653-10.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-
Iron Alloy Coated (Galvannealed) by the Hot Dip
Process
 - B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate
 - B221-08.....Aluminum and Aluminum-Alloy Extruded Bars,
Rods, Wire, Shapes, and Tubes
 - F468-10.....Nonferrous Bolts, Hex Cap Screws, and Studs for
General Use
 - F593-02(R2008).....Stainless Steel Bolts, Hex Cap Screws, and
Studs
- C. American Welding Society (AWS):
- D1.1-10.....Structural Welding Code Steel
 - D1.2-08.....Structural Welding Code Aluminum
 - D1.3-08.....Structural Welding Code Sheet Steel
- D. National Association of Architectural Metal Manufacturers (NAAMM)
- AMP 500 Series-2006.....Metal Finishes Manual
- E. American Architectural Manufacturers Association (AAMA):
- 2605-11.....Voluntary Specification for High Performance
Organic Coatings on Architectural Extrusions
and Panels
- F. Federal Specifications (Fed. Spec):
- TT-P-645B.....Primer, Paint, Zinc-Molybdates, Alkyd Type
- G. National Fire Protection Association (NFPA):
- 80-10.....Fire Doors and Fire Windows

1.5 QUALITY ASSURANCE

- A. Fire & Smoke Rated Assemblies: Provide all shutters with fire and smoke resistance rating required to comply with governing regulations which are inspected, tested, listed and labeled by UL, WH or FM and complying with NFPA 80 for class of opening. Provide units tested in accordance with the requirements of UL 10B, UL 1784, NFPA 252, ASTM E-152. Provide testing laboratory label permanently fastened to each fire and smoke shutter assembly.
- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of federal, state and municipal authorities having jurisdiction.
- C. Testing: Provide documentation from a certified testing agency that the fire shutter's self-closing governor mechanism and fire shutter operator have been tested for a minimum of 50,000 cycles and 500 self closing trip tests.
- A1 D. Manufacturer Requirements: Shutter manufacturer shall have been in the business of and have experience in manufacturing the type of product covered under this specification section as well as giving credible service for a minimum of three (3) years. Provide list of at least ten (10) completed projects which include the products covered under this section.

1.6 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver and store materials in manufacturer's original packaging, labeled to show name, brand and type. Store materials in a protected dry location off the ground in accordance with manufacturer's instructions.

1.7 WARRANTY

- A. Shutter Warranty: Furnish one (1) year written warranty signed by the manufacturer and installer agreeing to repair or replace work which has failed as a result of defects in materials or workmanship. Upon notification within the warranty period, such defects shall be repaired at no cost to the owner.

PART 2 - PRODUCTS**2.1 COILING COUNTER FIRE & SMOKE RATED SHUTTERS**

- A. Manufacturer: Coiling counter fire and smoke rated shutters shall be Auto-Set System model CFS-M-PC as manufactured by McKeon Door Company or equal.

2.2 MATERIALS & FABRICATION

A. Fire Rated Shutter:

1. Integral shutter, and frame type unit for installation with hood and fascia, sloping top, related accessories and components, and automation closing by fusible link.
2. Comply with NFPA 80. 4. Construct of galvanized steel on exposed to view components except counter.

B. Curtain:

1. Shall be assembled of interlocking galvanized steel slats, cold rolled. Slats shall have endlocks locking each end of alternate slats to act as a wearing surface, and maintain slat alignment. Curtain shall be 22 gauge minimum or gauge required by UL, WH or FM which ever is greater.
 - a. Slats: Shall be of a cross section not less than 1¼" wide by ½" deep.

- C. Bottom Bar: Shall consist of a single steel angle not less than 1½" x 1½" formed to fit slats. Bottom bar shall be provided with slotted holes to allow for thermal expansion.

- D. Guides: Each guide assembly shall be fabricated of a minimum 1/8" steel angles and channels formed to a box type configuration. Guides shall be provided with slotted holes to allow for thermal expansion.

1. Provide internal, fully concealed UL Classified smoke seals located within each guide assembly. Externally mounted smoke seals shall not be acceptable.
2. Drywall Applications: Provide steel support tubes designed and constructed with a slip joint at the top to allow for thermal expansion.

- E. Mounting Brackets: Fabricated of hot rolled 1/8" steel plate minimum, brackets shall be provided to house ends of the counterbalance barrel assembly.

- F. Hood: Shall be provided to entirely enclose curtain and counterbalance barrel assembly. Hood shall be fabricated 22 gauge galvanized steel and designed to match brackets. Top and bottom shall be bent and reinforced for stiffness.
1. Provide UL Classified lintel smoke seals.
 2. Counterbalance Assembly: Fire shutter shall be counterbalanced by means of adjustable steel helical torsion springs attached to shaft enclosed in pipe with required mounting blocks or rings for attachment of curtain. Grease sealed bearings or self-lubricating graphite bearings shall be attached to the spring barrel which shall be fabricated of hot formed structural quality carbon steel seamless pipe.
 - a. shaft of steel pipe of sufficient strength to ensure deflection not exceeding 1 mm (0.03-inch) per 300 mm (1 foot) of span.
 - b. shaft house oil-tempered, helically wound steel spring, and rotate on grease-sealed ball or roller-bearing units.
 - c. Spring adjustable from outside.
 - d. Brackets not less than 3 mm (0.125-inch) thick steel designed to form end closure support for head.
- G. Electric Motor Operator: Fire shutter shall be provided with a compact power unit designed and built by the shutter manufacturer. Operator shall be equipped with an adjustable screw-type limit switch to break the circuit at termination of travel. High efficiency planetary gearing running in an oil bath, shall be furnished together with a centrifugal governor, magnetic operated brake and a fail-safe magnetic release device, completely housed to protect against damage, dust and moisture. An efficient overload protection device, which will break the power circuit and protect against damage to the motor windings shall be integral with the unit. Operator is to be housed in a NEMA type 1 enclosure.
1. Motor: Shall be intermediate duty, thermally protected, ball bearing type with a class A or better insulation. Horsepower of motor is to be 1/3hp minimum or of manufacturer's recommended size, which ever is greater.
 2. Starter: Shall be size "0" magnetic reversing starter, across the line type with mechanical and electrical interlocks, with 10 amp continuous rating and 24 volt control circuit.

3. Reducer: Planetary gear type, 80% efficiency minimum.
 4. Brake: Magnetically activated, integral within the operator's housing.
 5. Control Station: Provide flush mount key switch control station marked open, close and stop.
- H. Self-Closing Mechanism: The fire shutter is to be designed with a centrifugal governor as an integral part of the operator's construction. The automatic release mechanism shall be activated by a fusible link, smoke detector or fire alarm. When activated the shutter is released and begins to close due to gravitational force. The speed of the shutter is governed by a centrifugal governor, designed to match the normal operating speed of the shutter, at a rate of not greater than 9" per second or less than 6" per second.
- I. Magnetic Release with 10 Second Time Delay: A fail-safe magnetic release device shall be built into the operator as an integral part of the release mechanism. When power is interrupted to the release mechanism by the smoke detector or fire alarm, the shutter shall begin to self-close. In the event of power failure the time delay shall prevent the fire shutter from closing for a period of 10 seconds. Once the 10 seconds have lapsed, the fire shutter shall self-close. Once power has been restored to the release mechanism the automatic reset time delay as well as the fire shutter shall automatically reset themselves.
- J. Obstruction Sensing Safety Edge: The fire shutter shall be designed with an obstruction sensing safety edge. In the event that the safety edge meets an obstruction during the normal closing operation, the shutter shall stop, reverse and return to the open position. In the event the safety edge meets an obstruction during the self-closing operation, the shutter shall come to rest on the obstruction and once the obstruction has been removed the fire shutter shall continue to the fully closed position.
- K. Easy Trip Test Feature: The fire shutter shall be designed so that it may be trip tested simply by cutting power to the operator. By turning the power switch off, the shutter shall self-close. Once the fire shutter has satisfactorily closed, it shall be reset simply by turning the power back on. No ladders or tools shall be needed to reset the shutter or the time delay unit.

- L. True Test Panel: Fire shutters shall be provided with a True Test panel. The test panel shall activate all the fire shutters to close via gravity not power and shall be in accordance with NFPA Bulletin 80. Only one test panel shall be required to test all the fire shutters on this project.

2.3 FINISH

- A. Galvanized Steel: After completion of fabrication, clean all metal surfaces to remove dirt and chemically treat to provide for powder coat adhesion. Provide powder coat finish of color as selected by architect from manufacturer's standard RAL powder coat selection chart.
 - 1. Finish painted under Section 09 91 00, PAINTING.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and field conditions to which this work is to be performed and notify architect if conditions of surfaces exist which are detrimental to proper installation and timely completion of work.
- B. Verify all dimensions taken at job site affecting the work. Notify the architect in any instance where dimensions vary.
- C. Coordinate and schedule work under this section with work of other sections so as not to delay job progress.

3.2 INSTALLATION

- A. Perform installation using only factory approved and certified representatives of the shutter manufacturer.
- B. Install shutter assemblies at locations shown in perfect alignment and elevation, plumb, level, straight and true.
- C. Adjust shutter installation to provide uniform clearances and smooth non-binding operation.
- D. Install wiring in accordance with applicable local codes and the National Electrical Code Standard. Materials shall be UL listed.
- E. Test shutter closing sequence when activated by the building's fire alarm system. Reset shutter after successful test.

3.3 REPAIR

- A. Repair damaged zinc-coated surfaces by applying galvanized repair compound in accordance with the manufacturer's directions.

3.4 PROTECTION & CLEANING

- A. Protect installed work using adequate and suitable means during and after installation until accepted by owner.
- B. Remove, repair or replace materials which have been damaged in any way.
- C. Clean surfaces of grime and dirt using acceptable and recommended means and methods.

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SECTION 085113
ALUMINUM WINDOWS
FOR INFORMATION ONLY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Fabrication and installation of new aluminum windows, intended to reproduce existing historic wood windows.
 - 1. Thermally-separated construction.
 - 2. Extruded aluminum framing.
 - 3. False muntins and panning.
 - 4. Insulated vision glass (GL-21) and spandrel glass (GL-41).

1.2 DEFINITIONS

- A. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance which are important to the successful rehabilitation as determined by the Architect.
- B. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by the Architect.
- C. Reproduce: To fabricate a new item, accurate in detail to the original, and in either the same or a similar material as the original, unless otherwise indicated.

1.3 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Window Certification: AMMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA 101/I.S.2/NAFS as follows:
 - 1. Minimum Performance Class: AW, Architectural.
 - 2. Minimum Performance Grade: 50.
- C. Solar Heat Gain Coefficient:
 - 1. Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.40 as determined according to NFRC 200.
- D. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.55 Btu/sq. ft. x h x deg F.
- E. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 50 at frame and CRF of 60 at glass.
- F. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation 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.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

- C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.
- D. Qualification Data: For manufacturer and Installer.
- E. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
 - 2. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.
 - b. Glazing Units: 10 years from date of Substantial Completion.
 - c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ALUMINUM WINDOWS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. EFCO Corporation;
 - 2. Kawneer North America;
 - 3. Wausau Window and Wall Systems.
- B. Custom, shop-fabricated aluminum windows utilizing thermally-separated construction; glazed with insulated glass; to replicate historic wood windows. Fabricate windows of size and configuration as shown on Drawings, including the following:
 - 1. Double-hung, operable sashes.
 - 2. Fixed windows.
 - 3. Arched (radiused headers).
 - 4. Mullions

2.2 WINDOW COMPONENTS

- A. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 1. Extruded aluminum alloy 6063-T6, tempered.
- B. Dividers (False Muntins): Provide extruded-aluminum divider grilles in designs indicated for each sash lite.
 - 1. Type: Permanently located between lites of insulated glass unit.
 - 2. Pattern: As indicated on Drawings.
 - 3. Profile: As selected by Architect to match existing.

- C. Subsills: Provide thermally-broken, extruded-aluminum subsills in sizes and configurations to match existing.
- D. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.
- E. Interior Trim: Provide extruded-aluminum profiles in sizes and configurations to match existing.
- F. Panning Trim: Provide extruded-aluminum panning trim profiles (2 profiles) in sizes and configurations to match existing.
- G. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.3 HARDWARE

- A. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.
- B. Hung Window Hardware:
 - 1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
 - 2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
 - 3. Tilt Latch: Releasing latch allows sash to pivot about horizontal axis to facilitate cleaning exterior surfaces from the interior.

2.4 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
 - 1. Type and Location: Full, outside for double-hung sashes.
- B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
 - 1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
- C. Aluminum Wire Fabric: 18-by-16 mesh of 0.011-inch- diameter, coated aluminum wire.
 - 1. Wire-Fabric Finish: Black.

2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 - 1. Specified glass thickness and thickness of individual glass plies are minimum.
 - 2. Provide heat-strengthened lites as required for wind pressure or thermal stress.
 - 3. Provide fully-tempered complying with ASTM C1048, Kind FT (fully tempered), as required to comply with safety code requirements.
 - 4. Provide safety glazing labeling, as applicable.

5. Manufacturer's standard dual sealing system with black colored silicone.
 6. Spacer: Aluminum with black, color anodic finish.
 7. Desiccant: Molecular sieve or silica gel, or blend of both.
 8. Provide insulated glass units with specified false muntins installed within air space between glass lites.
- B. Transom panels to be spandrel glazing (GL-41) if located above the adjacent ceiling elevation, and vision glazing (GL-21) in operable sash if located below the adjacent ceiling elevation.
- C. (GL-21) Clear Insulating Glass Units:
1. Configuration: 1-inch thick unit as follows:
 - a. Outboard Lite: 1/4-inch thick, clear glass; with high-performance low-emissivity coating applied to No. 2 surface.
 - b. Airspace: 1/2-inch, argon-filled space.
 - c. Inboard Lite: 1/4-inch thick, clear glass.
 2. Product and Manufacturer: Solarban 60 by Oldcastle Glass.
 - a. Visible Transmittance: 70 percent.
 - b. Ultraviolet Transmission: 19 percent.
 - c. Nighttime Winter U-value: 0.29
 - d. Solar Heat Gain Coefficient: 0.38
- D. (GL-41) Clear, Ceramic-Coated, Insulating Spandrel Glass Units: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.
1. Product and Manufacturer: Solarban 60 by Oldcastle Glass.
 2. Configuration: 1-inch thick unit as follows:
 - a. Outboard Lite: 1/4-inch thick, clear glass, heat-strengthened.
 - b. Airspace: 1/2-inch, argon-filled space.
 - c. Inboard Lite: 1/4-inch thick, clear glass, heat-strengthened, with opaque ceramic coating on No. 4 surface.
 - 1) Ceramic Frit:
 - (a) Pattern: Solid, Opaque.
 - (b) Color: Charcoal Gray.

2.6 FABRICATION

- A. Fabricate exposed surfaces and components in sizes and profiles to match existing windows, with accurate curves, lines, and angles. Include a complete system for assembling components and anchoring windows.
- B. Window unit is to be constructed in a manner that will facilitate the replacement of worn or damaged parts, hardware, or weather-strip
- C. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.
- D. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
- E. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- F. Where sash frames lap the wrong way to shed water, provide water-shed members above side-hinged sashes and similar lines of natural water penetration.
- G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible.
 1. Glaze aluminum windows in the factory.
 2. Disassemble components only as necessary for shipment and installation.

2.7 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
 - 1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. High-Performance Organic Two-Coat Fluoropolymer Coating: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with with AAMA 2605 and coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: White color as selected by Architect to match Architect's sample.

PART 3 EXECUTION

3.1 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

3.2 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.

- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

- A. Caulking: Section 07 92 00 JOINT SEALANTS.
- B. Application of Hardware: Section 08 14 00, WOOD DOORS; Section 08 11 13, HOLLOW METAL DOORS AND FRAMES; and Section 08 71 13.11, LOW ENERGY DOOR OPERATORS
- C. Painting: Section 09 91 00, PAINTING.
- D. Card Readers: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEMS.
- E. Electrical: Division 26, ELECTRICAL.
- F. Fire Detection: Section 28 31 00, FIRE DETECTION AND ALARM.

1.4 GENERAL

- A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.
- B. Provide rated door hardware assemblies where required by most current version of the International Building Code (IBC).
- C. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.
- D. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.
- E. The following items shall be of the same manufacturer, if possible, except as otherwise specified:
 - 1. Mortise locksets.
 - 2. Hinges for hollow metal and wood doors.
 - 3. Surface applied overhead door closers.

4. Exit devices.
5. Floor closers.

1.5 WARRANTY

- A. Automatic door operators shall be subject to the terms of FAR Clause 52.24-21, except that the Warranty period shall be two years in lieu of one year for all items except as noted below:
1. Locks, latchsets, and panic hardware: 5 years.
 2. Door closers and continuous hinges: 10 years.

1.6 MAINTENANCE MANUALS

- A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware.

1.7 SUBMITTALS

- A. Submit in accordance with:
1. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Submit 6 copies of the schedule per Section 01 33 23 plus 2 copies to the VAMC Locksmith (VISN Locksmith if the VAMC does not have a locksmith).
- C. Hardware Schedule: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation

- D. Samples:
1. General:
 - a. All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.

- b. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.
 - c. Finish Verification: Submit hardware samples with each type required finish from each manufacturer, for review and comparison of visual characteristics.
- E. Manufacturer's Literature:
- 1. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

1.8 DELIVERY AND MARKING

- A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to Contracting Officer's Technical Representative for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in Contracting Officer's Technical Representative's office until all other similar items have been installed in project, at which time the Contracting Officer's Technical Representative will deliver items on file to Contractor for installation in predetermined locations on the project.

1.9 PREINSTALLATION MEETING

- A. Convene a preinstallation meeting not less than 30 days before start of installation of door hardware. Require attendance of parties directly affecting work of this section, including Contractor and Installer, Architect, Project Engineer and VA Locksmith, Hardware Consultant, and Hardware Manufacturer's Representative. Review the following:
 - 1. Inspection of door hardware.
 - 2. Job and surface readiness.
 - 3. Coordination with other work.
 - 4. Protection of hardware surfaces.
 - 5. Substrate surface protection.

- 6. Installation.
- 7. Adjusting.
- 8. Repair.
- 9. Field quality control.
- 10. Cleaning.

1.10 INSTRUCTIONS

- A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters (e.g., "HW") followed by a number. Each number designates a set of hardware items applicable to a door type.
- B. Manufacturers' Catalog Number References: Where manufacturers' products are specified herein, products of other manufacturers which are considered equivalent to those specified may be used. Manufacturers whose products are specified are identified by abbreviations as follows:

Adams-Rite	Adams Rite Mfg. Co.	Pomona, CA
Best	Best Access Systems	Indianapolis, IN
Don-Jo	Don-Jo Manufacturing	Sterling, MA
G.E. Security	GE Security, Inc.	Bradentown, FL
Markar	Markar Architectural Products	Pomona, CA
Pemko	Pemko Manufacturing Co.	Ventura, CA
Rixson	Rixson	Franklin Park, IL
Rockwood	Rockwood Manufacturing Co.	Rockwood, PA
Securitron	Securitron Magnalock Corp.	Sparks, NV
Southern Folger	Southern Folger Detention Equipment Co.	San Antonio, TX
Stanley	The Stanley Works	New Britain, CT
Tice	Tice Industries	Portland, OR
Trimco	Triangle Brass Mfg. Co.	Los Angeles, CA
Zero	Zero Weather Stripping Co.	New York, NY

- C. Keying: All cylinders shall be keyed into existing Grand Master Key System. Provide removable core cylinders that are removable only with a special key or tool without disassembly of knob or lockset. Cylinders shall be 7 pin type. Keying information shall be furnished at a later date by the Contracting Officer's Technical Representative. Lock cores are Schlage Everest 7-pin small format interchangeable core, restricted keyway is B145. Cores to be purchased through Ewert Wholesale Hardware.

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. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.
- B. American Society for Testing and Materials (ASTM):
- F883-04.....Padlocks
- E2180-07.....Standard Test Method for Determining the
Activity of Incorporated Antimicrobial Agent(s)
In Polymeric or Hydrophobic Materials
- C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
- A156.1-06.....Butts and Hinges
- A156.2-03.....Bored and Pre-assembled Locks and Latches
- A156.3-08.....Exit Devices, Coordinators, and Auto Flush
Bolts
- A156.4-08.....Door Controls (Closers)
- A156.5-01.....Auxiliary Locks and Associated Products
- A156.6-05.....Architectural Door Trim
- A156.8-05.....Door Controls-Overhead Stops and Holders
- A156.12-05Interconnected Locks and Latches
- A156.13-05.....Mortise Locks and Latches Series 1000
- A156.14-07Sliding and Folding Door Hardware
- A156.15-06.....Release Devices-Closer Holder, Electromagnetic
and Electromechanical
- A156.16-08.....Auxiliary Hardware
- A156.17-04Self-Closing Hinges and Pivots
- A156.18-06.....Materials and Finishes
- A156.20-06Strap and Tee Hinges, and Hasps

- A156.21-09.....Thresholds
- A156.22-05.....Door Gasketing and Edge Seal Systems
- A156.23-04.....Electromagnetic Locks
- A156.24-03.....Delayed Egress Locking Systems
- A156.25-07Electrified Locking Devices
- A156.26-06.....Continuous Hinges
- A156.28-07Master Keying Systems
- A156.29-07Exit Locks and Alarms
- A156.30-03High Security Cylinders
- A156.31-07Electric Strikes and Frame Mounted Actuators
- A250.8-03.....Standard Steel Doors and Frames
- D. National Fire Protection Association (NFPA):
 - 80-10.....Fire Doors and Fire Windows
 - 101-09.....Life Safety Code
- E. Underwriters Laboratories, Inc. (UL):
 - Building Materials Directory (2008)

PART 2 - PRODUCTS

2.1 BUTT HINGES

- A. ANSI A156.1. Provide only three-knuckle hinges, except five-knuckle where the required hinge type is not available in a three-knuckle version (e.g., some types of swing-clear hinges). The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:
 - 1. Interior Doors: Type A8112/A5112 for doors 900 mm (3 feet) wide or less and Type A8111/A5111 for doors over 900 mm (3 feet) wide. Hinges for doors exposed to high humidity areas (shower rooms, toilet rooms, kitchens, janitor rooms, etc. shall be of stainless steel material.
- B. Provide quantity and size of hinges per door leaf as follows:
 - 1. Doors up to 1210 mm (4 feet) high: 2 hinges.
 - 2. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
 - 3. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
 - 4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.

5. Doors over 900 mm (3 feet) to 1065 mm (3 feet 6 inches) wide,
standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
 6. Doors over 1065 mm (3 feet 6 inches) to 1210 mm (4 feet), heavy
weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
 7. Provide heavy-weight hinges where specified.
 8. At doors weighing 330 kg (150 lbs.) or more, furnish 127 mm (5 inch)
high hinges.
- C. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots
and hinges other than butts specified above and continuous hinges
specified below.

2.2 CONTINUOUS HINGES

- A. ANSI/BHMA A156.26, Grade 1-600.
 1. Listed under Category N in BHMA's "Certified Product Directory."
- B. General: Minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with
minimum overall width of 4 inches (102 mm); fabricated to full height
of door and frame and to template screw locations; with components
finished after milling and drilling are complete
- C. Continuous, Barrel-Type Hinges: Hinge with knuckles formed around a
Teflon-coated 6.35mm (0.25-inch) minimum diameter pin that extends
entire length of hinge.
 1. Base Metal for Interior Hinges: Stainless steel
 2. Base Metal for Hinges for Fire-Rated Assemblies: Stainless steel
 3. Provide with non-removable pin (hospital tip option) at lockable
outswing doors.
 4. Where required to clear adjacent casing, trim, and wall conditions
and allow full door swing, provide wide throw hinges of minimum
width required.
 5. Provide with manufacturer's cut-outs for separate mortised power
transfers and/or mortised automatic door bottoms where they occur.
 6. Where thru-wire power transfers are integral to the hinge, provide
hinge with easily removable portion to allow easy access to wiring
connections.
 7. Where models are specified that provide an integral wrap-around edge
guard for the hinge edge of the door, provide manufacturer's
adjustable threaded stud and machine screw mechanism to allow the
door to be adjusted within the wrap-around edge guard.

2.3 DOOR CLOSING DEVICES

- A. Closing devices shall be products of one manufacturer.

2.4 OVERHEAD CLOSERS

- A. Conform to ANSI A156.4, Grade 1.
- B. Closers shall conform to the following:
 - 1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
 - 2. Where specified, closer shall have hold-open feature.
 - 3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.
 - 4. Material of closer body shall be forged or cast.
 - 5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
 - 6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
 - 7. Closers shall have full size metal cover; plastic covers will not be accepted.
 - 8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
 - 9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
 - 10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
 - 11. Provide parallel arm closers with heavy duty rigid arm.

12. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 1/2" (38mm) minimum piston diameter.

2.5 FLOOR CLOSERS AND FLOOR PIVOT SETS

- A. Comply with ANSI A156.4. Provide stainless steel floor plates for floor closers and floor pivots, except where metal thresholds occur. Provide cement case for all floor closers. Floor closers specified for fire doors shall comply with Underwriters Laboratories, Inc., requirements for concealed type floor closers for classes of fire doors indicated on drawings. Hold-open mechanism, where required, shall engage when door is opened 105 degrees, except when door swing is limited by building construction or equipment, the hold-open feature shall engage when door is opened approximately 90 degrees. The hold-open mechanism shall be selectable on/off by turning a screw through the floor plate. Floor closers shall have adjustable hydraulic back-check, adjustable close speed, and adjustable latch speed. Provide closers with delayed action where a hold-open mechanism is not required. Floor closers shall be multi-sized. Single acting floor closers shall also have built in dead stop. Where required, provide closers with special cement cases appropriate for shallow deck installation or where concrete joint lines run through the floor blockout. At offset-hung doors installed in deep reveals, provide special closer arm and spindle to allow for installation. Where stone or terrazzo is applied over the floor closer case, provide closer without floor plate and with extended spindle (length as required) and special cover pan (depth as required) to allow closer to be accessed without damaging the material applied over the closer. Pivots for non-labeled doors shall be cast, forged or extruded brass or bronze.
- B. Where floor closer appears in hardware set provide the following as applicable.
 1. Double Acting Floor Closers: Type C06012.
 2. Single Acting Floor Closer: Type C06021 (center pivoted).
(Intermediate pivot is not required).
 3. Single Acting Floor Closers: Type C06041 (offset pivoted).

4. Single Acting Floor Closer for Labeled Fire Doors: Type C06051 (offset pivoted).

2.6 COMBINATION CLOSER - HOLDER

- A. Conform to ANSI A156.15; combination closer-holder with built-in electronic release.
- B. Combination closer-holder shall have the following features:
 1. Control door closing and latching sequence by hydraulic action.
 2. Wiring for 24V DC current. Current draw shall not exceed 0.16 amperes.
 3. Combination closer-holder type:
 - a. At doors with 90-110° hold-open point: Single lever arm with slide track closing action, and adjustable hydraulic back-check. Provide tracks with spring-cushion stop assemblies to avoid the necessity of a separate wall or floor stop. Provide with double egress arm where required.
 - b. At doors with over 110° to 175° hold-open point: Single or double lever arm and adjustable hydraulic back-check. Provide with long arms where required for deep frame reveals.
 4. Spring power for closing force shall conform to ANSI A156.4 and have 50% spring power adjustment.
 5. Size closers per manufacturer's printed catalog recommendations.
 6. Hold open mechanism shall hold door open between 85 degrees and 175 degrees depending on wall and frame conditions. Mount device to provide maximum door opening permitted by building construction or equipment.
 7. Electronic release shall release door when signaled by smoke detector and alarm signal from fire alarm control panel. Smoke detectors shall not be incorporated as an integral part of door holders. Smoke detectors are specified in the ELECTRICAL Section.
 8. All closers to have full covers.
 9. All closers shall have a 1 ½" minimum piston diameter and an adjustable back check position valve.

2.7 DOOR STOPS

- A. Conform to ANSI A156.16.

- B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For concrete, masonry or quarry tile construction, use lead expansion shields for mounting door stops.
- C. Where cylindrical locks with turn pieces or pushbuttons occur, equip wall bumpers Type L02251 (rubber pads having concave face) to receive turn piece or button.
- D. Provide floor stops (Type L02141 or L02161 in office areas; Type L02121 x 3 screws into floor elsewhere. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.
- E. Where drywall partitions occur, use floor stops, Type L02141 or L02161 in office areas, Type L02121 elsewhere.
- F. Provide stop Type L02011, as applicable for exterior doors. At outswing doors where stop can be installed in concrete, provide stop mated to concrete anchor set in 76mm (3-inch) core-drilled hole and filled with quick-setting cement.
- G. Omit stops where floor mounted door holders are required and where automatic operated doors occur.
- H. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.
- I. Provide appropriate door mounted stop on doors in individual toilets where floor or wall mounted stops cannot be used.
- J. Provide overhead surface applied stop Type C02541, ANSI A156.8 on patient toilet doors in bedrooms where toilet door could come in contact with the bedroom door.
- K. Provide door stops on doors where combination closer magnetic holders are specified, except where wall stops cannot be used or where floor stops cannot be installed within 4-inches of the wall.
- L. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).

2.8 OVERHEAD DOOR STOPS AND HOLDERS

- A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110 degree opening, unless limited by building construction or equipment. Provide Grade 1 overhead concealed slide type: stop-only at rated doors and security doors, hold-open type with exposed hold-open on/off control at all other doors requiring overhead door stops.

2.9 FLOOR DOOR HOLDERS

- A. Conform to ANSI Standard A156.16. Provide extension strikes for Types L01301 and L01311 holders where necessary.

2.10 LOCKS AND LATCHES

- A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall have not less than seven pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw, unless shorter throw allowed by the door manufacturer's fire label. Provide temporary keying device or construction core of allow opening and closing during construction and prior to the installation of final cores.
- B. In addition to above requirements, locks and latches shall comply with following requirements:
 - 1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13. Mortise locksets shall be series 1000, minimum Grade 2. All locksets and latchsets shall have lever handles fabricated from cast stainless steel. Provide sectional (lever x rose) lever design similar to Schlage #07A (Mortise) and Athens (Cylindrical) as acceptable to Owner and Architect. No substitute lever material shall be accepted. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch)

lip-to-center dimension. Lock function F02 shall be furnished with emergency tools/keys for emergency entrance. All lock cases installed on lead lined doors shall be lead lined before applying final hardware finish. Furnish armored fronts for all mortise locks. Where mortise locks are installed in high-humidity locations or where exposed to the exterior on both sides of the opening, provide non-ferrous mortise lock case.

2. Cylindrical Lock and Latch Sets: levers shall meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets shall be series 4000 Grade I. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Provide lever design to match design selected by Architect or to match existing lever design. Where two turn pieces are specified for lock F76, turn piece on inside knob shall lock and unlock inside knob, and turn piece on outside knob shall unlock outside knob when inside knob is in the locked position. (This function is intended to allow emergency entry into these rooms without an emergency key or any special tool.)
3. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.5.

2.11 ELECTROMAGNETIC LOCKS

- A. ANSI/BHMA A156.23; electrically powered, of strength and configuration indicated; with electromagnet attached to frame and armature plate attached to door. Listed under Category E in BHMA's "Certified Product Directory."
1. Type: Full exterior or full interior, as required by application indicated.
2. Strength Ranking: 500 lbf (2224 N).
3. Inductive Kickback Peak Voltage: Not more than 0 V.
4. Residual Magnetism: Not more than 4 lbf (18 N) to separate door from magnet.

2.12 ELECTRIC STRIKES

- A. ANSI/ BHMA A156.31 Grade 1.
- B. General: Use fail-safe electric strikes at fire-rated doors if specified.

2.13 KEYS

- A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

Locks/Keys	Quantity
Cylinder locks	2 keys each
Cylinder lock change key blanks	100 each different key way
Master-keyed sets	6 keys each
Grand Master sets	6 keys each
Great Grand Master set	5 keys
Control key	2 keys

2.14 KEY CABINET

- A. ANSI Standard A156.5. Provide key cabinet made of cold rolled, 1.2 mm (0.0478 inch) thick furniture steel electro-welded. Doors shall have "no sag" continuous brass-pin piano type hinge and be equipped with chrome plated locking door handles, hook cam and mechanical pushbutton door lock. Key Cabinet and Key Control System shall accommodate all keys for this project plus 25 percent. Provide minimum number of multiple cabinets where a single cabinet of largest size will not accommodate the required number of keys.
- B. Key tags shall consist of two sets: Permanent self-locking and loan key snaphook type with tag colors as follows: Red fiber marker of the permanent self-locking type approximately 32 mm (1-1/4 inch) in diameter engraved with the legend "FILE KEY MUST NOT BE LOANED." Also furnish for each hook a white cloverleaf key marker with snap-hooks engraved with the legend "LOAN KEY."
- C. The manufacturer of the lock cylinders and locks shall attach a key tag to keys of each lock cylinder and shall mark thereon the respective item number and key change number. Provide each group of keys in a key gathering envelope (supplied by Key Cabinet Manufacturer) in which the lock manufacturer shall include the following information: Item number, key change number and door number. The contractor shall furnish the Key Cabinet Manufacturer the hardware and keying schedules and change keys.

- D. The Key Cabinet Manufacturer shall set up a three-way cross index system, including master keys, listing the keys alphabetically, the hooks numerically and the key changes numerically on different colored index cards. Index cards shall be typewritten and inserted in a durable binder. Attach the keys to the two sets of numbered tags supplied with the cabinet. (The permanent tag and the loan key tag). Instruct the owner in proper use of the system. Install cabinet as directed by the Contracting Officer's Technical Representative.

2.15 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING

- A. Conform to ANSI Standard A156.6.
- B. Provide protective plates as specified below:
1. Kick plates, mop plates and armor plates of metal, Type J100 series.
 2. Provide kick plates and mop plates where specified. Kick plates shall be 254 mm (10 inches) or 305 mm (12 inches) high. Mop plates shall be 152 mm (6 inches) high. Both kick and mop plates shall be minimum 1.27 mm (0.050 inches) thick. Provide kick and mop plates beveled on all 4 edges (B4E). On push side of doors where jamb stop extends to floor, make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other kick and mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick and mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.
 3. Kick plates and/or mop plates are not required on following door sides:
 - a. Armor plate side of doors;
 - b. Exterior side of exterior doors;
 - c. Closet side of closet doors;
 - d. Both sides of aluminum entrance doors.
 4. Where louver or grille occurs in lower portion of doors, substitute stretcher plate and kick plate in place of armor plate. Size of stretcher plate and kick plate shall be 254 mm (10 inches) high.

5. Provide stainless steel edge guards where so specified at wood doors. Provide mortised type instead of surface type except where door construction and/or ratings will not allow. Provide edge guards of bevel and thickness to match wood door. Provide edge guards with factory cut-outs for door hardware that must be installed through or extend through the edge guard. Provide full-height edge guards except where door rating does not allow; in such cases, provide edge guards to height of bottom of typical lockset armor front. Forward edge guards to wood door manufacturer for factory installation on doors.

2.16 EXIT DEVICES

- A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.
- B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.
- C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.
- D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.
- E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.
- F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.17 FLUSH BOLTS (LEVER EXTENSION)

- A. Conform to ANSI A156.16. Flush bolts shall be Type L24081 unless otherwise specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors.

- B. Lever extension manual flush bolts shall only be used at non-fire-rated pairs for rooms only accessed by maintenance personnel.
- C. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).
- D. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.
- E. Provide extension rods for top bolt where door height exceeds 2184 mm (7 feet 2 inches).

2.18 COORDINATORS

- A. Conform to ANSI A156.16. Coordinators, when specified for fire doors, shall comply with Underwriters Laboratories, Inc., requirements for fire door hardware. Coordinator may be omitted on exterior pairs of doors where either door will close independently regardless of the position of the other door. Coordinator may be omitted on interior pairs of non-labeled open where open back strike is used. Open back strike shall not be used on labeled doors. Paint coordinators to match door frames, unless coordinators are plated. Provide bar type coordinators, except where gravity coordinators are required at acoustic pairs. For bar type coordinators, provide filler bars for full width and, as required, brackets for push-side surface mounted closers, overhead stops, and vertical rod panic strikes.

2.19 THRESHOLDS

- A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with ¼-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.
- B. For thresholds at elevators entrances see other sections of specifications.
- C. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.
- D. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) from frame face.

2.20 AUTOMATIC DOOR BOTTOM AND JAMB SEALS FOR LIGHT PROOF OR SOUND CONTROL DOORS

- A. Conform to ANSI A156.22. Provide mortise door bottom seal, and adjustable jamb applied seals. For mortise automatic door bottoms, provide type specific for door construction (wood or metal).

2.21 MISCELLANEOUS HARDWARE

- A. Access Doors (including Sheet Metal, Screen and Woven Wire Mesh Types): Except for fire-rated doors and doors to Temperature Control Cabinets, equip each single or double metal access door with Lock Type E76213, conforming to ANSI A156.5. Key locks as directed. Ship lock prepaid to the door manufacturer. Hinges shall be provided by door manufacturer.
- B. Cylinders for Various Partitions and Doors: Key cylinders same as entrance doors of area in which partitions and door occur. Provide cylinders to operate locking devices where specified for following partitions and doors:

- 1. Fire-rated access doors - Engineer's key set.

- C. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel or wood door frame, except at fire-rated frames, lead-lined frames and frames for sound-resistant, lightproof and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

2.22 PADLOCKS FOR VARIOUS DOORS, GATES AND HATCHES

- A. ASTM E883, size 50 mm (2 inch) wide chain; furnish extended shackles as required by job conditions. Provide padlocks, with key cylinders, for each door in following areas as noted.
- B. Key padlocks as follows:
 - 1. Chain Link Fence Gates for Electrical Substation and other Fenced Buildings or Areas: Engineer's set, except as otherwise specified.

2.23 THERMOSTATIC TEMPERATURE CONTROL VALVE CABINETS

- A. Where lock is shown, equip each cabinet door (metal) with lock Type E06213, conforming to ANSI A156.5. Key locks in Key Sets approved by Contracting Officer. See mechanical drawings and specifications for location of cabinets.

- B. Cabinet manufacturer shall supply the hinges, bolts and pulls. Ship locks to cabinet manufacturer for installation.

2.24 FINISHES

- A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes."

B. Finish Symbols

US	BHMA	DESCRIPTION OF FINISH
USP	600	Primed for field painting
US26D	626/652	Satin Chrome
US28	628	Satin Aluminum
US32	629	Bright Stainless
US32D	630	Satin Stainless
N/A	689	Aluminum Painted

- C. Exposed Finishes: Provide surfaces on exterior and interior of buildings as follows, unless otherwise indicated by Contract Documents:

1. Exterior: US32D/BHMA 630.
2. Interior: US32D/BHMA 630.

D. Miscellaneous Finishes:

1. Continuous Hinges: US32D/BHMA 630.
2. Pivots: Match door trim.
3. Push Bar: US32D/BHMA 630.
4. Lever Exit Device Trim: US32D/BHMA 630.
5. Push/Pull Trim: US32D/BHMA 630.
6. Door Closers: BHMA 689, match 630 as acceptable to Architect.
7. Thresholds: Mill finish aluminum.
8. Cover plates for floor hinges and pivots: US32D/BHMA 630.
9. Other primed steel hardware: 600.
10. Miscellaneous: To match other finishes

- E. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified.

F. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag⁺). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

2.25 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	Base Metal
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

- A. For new and renovated buildings locate hardware on doors at heights specified below, with all hand-operated hardware centered within 864 mm (34 inches) to 1200 mm (48 inches), unless otherwise noted:
- B. Hardware Heights from Finished Floor:
- Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
 - Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
 - Deadlocks centerline of strike 1219 mm (48 inches).
 - Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
 - Centerline of door pulls to be 1016 mm (40 inches).
 - Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
 - Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
 - Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Hinge Size Requirements:

Door Thickness	Door Width	Hinge Height
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)
35 mm (1-3/8 inch) (hollow core wood doors)	Not over 1200 mm (4 feet)	113 mm (4-1/2 inches)

C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

D. Where new hinges are specified for new doors in existing frames or existing doors in new frames, sizes of new hinges shall match sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by Contracting Officer's Technical Representative. Existing hinges shall not be reused on door openings having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.

E. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Dutch type doors	4 butts
Doors with spring hinges 1370 mm (4 feet 6 inches) high or less	2 butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

- F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.
- G. After locks have been installed; show in presence of Contracting Officer's Technical Representative that keys operate their respective locks in accordance with keying requirements. (All keys, Master Key level and above shall be sent Registered Mail to the VA with the bitting list. Also a copy of the invoice shall be sent to the Contracting Officer's Technical Representative for his records.) Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project.

3.3 FINAL INSPECTION

- A. Installer to provide letter to VA Resident/Project Engineer that upon completion, installer has visited the Project and has accomplished the following:
 - 1. Re-adjust hardware, after completion of building testing and balancing.
 - 2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
 - 3. Identify items that have deteriorated or failed.
 - 4. Submit written report identifying problems.

3.4 DEMONSTRATION

- A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of Resident/Project Engineer and VA Locksmith.

3.5 HARDWARE SETS

- A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.

ELECTRIC HARDWARE ABBREVIATIONS LEGEND:

ADO = Automatic Door Operator

EMCH = Electro-Mechanical Closer-Holder

MHO = Magnetic Hold-Open (wall- or floor-mounted)

INTERIOR SINGLE DOORSHW-1FEach Door to Have:NON-RATED

1	Continuous Hinge	A51031B
1	Latchset	F01
1	Kick Plate	J102
1	Wall Stop	L52101 CONVEX
3	Silencers	L03011

HW-2GEach Door to Have:RATED/NON-RATED

Hinges	QUANTITY & TYPE AS REQUIRED
1 Keyed Privacy Indicator Lock	F13 x OCCUPANCY INDICATOR
1 Electric Strike	
1 Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1 Kick Plate	J102
1 Mop Plate (@ Inswing Doors)	J102
1 Floor Stop	L02121 x 3 FASTENERS
1 Auto Door Bottom	R0Y346 - HEAVY DUTY
2 Set Self-Adhesive Seals	R0E154
1 Low Energy Door Operator with Motion Detector	As specified in Section 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS
2 Push Plate Actuating Switch	Provide 1 interior and 1 exterior

Note:

1. Threshold by other trades.

2. Push plate door operation shall be shunted by interior motion detector.

3. Interior push plate actuator shall override motion detection shunt.

4. Coordinate electrical power, operation and wiring requirements.

HW-3G

Each Door to Have:

NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Office Lock	F04
1	Closer	C02051/C02061 (PT4D, PT4H)
1	Floor Stop	L02121 x 3 FASTENERS
1	Coat Hook	L03121
1	Threshold	J32300 x 57 MM WIDTH (2-1/4 INCHES)
1	Auto Door Bottom	R0Y346 - HEAVY DUTY
2	Sets Self-Adhesive Seals	R0E154

Note:

1. OMIT VIEWER IF DOOR PROVIDED WITH VISION LITE.
2. OMIT COAT HOOK WHERE GLASS LITE PREVENTS INSTALLATION.
3. Automatic door bottom to be fully mortised or under door type.

HW-10D

Each Pair to Have:

NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Set Auto Flush Bolts	TYPE 25 LESS BOTTOM BOLT
1	Classroom Lock	F08
1	Coordinator	TYPE 21A
1	Overlapping Astragal with Self-Adhesive Seal	R5Y634 x R0E154 x THRU-BOLTS
2	Closers	C02051/C02061 (PT4D, PT4H)
2	Kick Plates	J102
2	Floor Stops	L02121 x 3 FASTENERS
1	Set Self-Adhesive Seals	R0E154

- - - E N D - - -

SECTION 08 71 13.11
LOW ENERGY POWER ASSIST DOOR OPERATORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies low energy power assisted automatic operation of swing doors. The door operator system shall be complete including operator, controls, door arm and operator enclosure (header and cover).

1.2 RELATED WORK

- A. Steel doors; Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
- B. Wood doors; Section 08 14 00, INTERIOR WOOD DOORS.
- C. Door hardware; Section 08 71 00, DOOR HARDWARE.
- D. Smoke detectors for control of fire/smoke doors to be wired per Section 28 31 00, FIRE DETECTION AND ALARM.
- E. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.

1.3 MANUFACTURER'S QUALIFICATIONS

- A. Power assisted door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three years.
- B. One manufacturer of automatic door equipment shall be used throughout the building project.

1.4 WARRANTY

- A. Power assisted door operators, controls and other related equipment shall be subject to the terms of the "Warranty of Construction", FAR clause 52.246-21, except that the warranty period shall be two years in lieu of one year. The named warranty holder shall be the Veterans Administration.

1.5 MAINTENANCE MANUALS

- A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS," furnish two copies of maintenance manuals and instructions on automatic door operators.

1.6 SUBMITTALS

- A. Submit in accordance with: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.

C. Shop Drawings:

Showing location of controls and safety devices in relationship to each automatically operated door. This includes templates, wiring diagrams, fabrication details, anchorage and other information to providers of related work to coordinate the proper installation of the door operators.

1.7 DESIGN CRITERIA

- A. Power assisted automatic door equipment shall accommodate normal traffic as well as the weight of the doors.
- B. Equipment: UL approved and comply with applicable codes. Motors shall be rated minimum one-quarter horsepower and shall be single phase and 115 volts.
- C. Electrical Wiring: Provide wiring so that only a single power supply is required. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

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. American National Standards Institute (ANSI):
ICC/ANSI A117.1-03.....Guideline for Accessible and Usable Buildings and Facilities-Providing Accessibility and Usability for Physically Handicapped People
- C. Builders Hardware Manufacturers Association, Inc. (BHMA):
156.19-07.....Power Assist and Low Energy Power Operated Doors

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. All automatic door operators shall be Keane-Monroe or approved equivalent.

2.2 OPERATORS

- A. Automatic door operators shall be for commercial doors and shall be electromechanical and surface mounted above the door to the header or transom bar. The opening force shall be generated by a permanent magnet DC motor driving a combination spiral bevel/spur gear reducer and transmitted to the door through an arm linkage. Opening speed shall be

adjustable and feature dual backcheck control allowing adjustment of backcheck speed and position. Closing shall be by spring force generated by a metal compression spring. The spring shall reduce manual opening force to not more than 67 N (15 lbf). The minimum diameter of spring wire shall be .007mm (172 in.). Under the specified design load of the door, the spring shall be capable of performing 2,000,000 cycles before fracture. Adjustable closing speed and fixed latch speed shall control the door in the closing cycle. The doors shall be operated manually at any time without damage to the operator or components.

B. All operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall recycle doors instantaneously to full open position from any point in closing cycle when control switch is reactivated.

C. Operator shall be swinging type enclosed in housing. Operator shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop. Door shall close by means of spring energy, and close force shall be controlled by gear system and motor being used as dynamic break without power. System shall operate as manual door control in event of power failure. Opening and closing speeds shall be adjustable:

1. Swing Operator Housing: Housing shall be 140 mm (5-1/2 inches) wide by 150 mm (6 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inch) and larger frame systems. All structural sections shall have a minimum thickness of 3.7 mm (0.146 inch) and be fabricated of 6063-T5 aluminum alloy.
2. Swing Power Operator: Completely assembled and sealed unit which shall include helical gear drive transmission, mechanical spring and bearings, all located in cast aluminum case and filled with special lubricant for extreme temperature conditions. A "DC" shunt-wound permanent magnet motor with sealed ball bearings shall be attached to transmission system. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.

3. Connecting hardware for swing overhead concealed type power operator shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing and adjustable slide block, traveling in an interconnected track and top pivot assembly. Top track and pivot assembly shall be fabricated of steel. Door shall not pivot on shaft of operator.
4. Electrical Control: Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator. Relays shall be plug-in type for individual replacement and all connecting harnesses shall have interlocking plugs. Control shall also include time delay for normal cycle. Swing door control shall include safe-swing circuit with optional switching which automatically limits power and slows door when approached from the doors swing area.
5. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.

2.3 MICROPROCESSOR CONTROLS

- A. The system shall include a multi-function microprocessor control providing adjustable hold open time (1 - 30 sec.), LED indications for actual position unknown, system status, open obstruction shutdown, activation signal, safety mat/sensor signal, Stop-and-Hold signal, and mode selector switches providing a means for easy field selection of the following functions: push-to-operate, latch assist and stack pressure. Control shall be capable of receiving activation signals from any device with normally open dry contact output.
 1. With push-to-operate function enabled, the control shall provide a means of initiating a self-start activation circuit by slightly pushing the door open at any point in the door swing.
 2. Latch Assist shall provide a two second impulse in the close direction to overcome restrictions with locking devices of pressure differentials, allowing the unit to operate in standard time delay mode, and permitting the door to close from the full open position after the hold time is satisfied. All activation modes shall provide fully adjustable opening speed.

- B. The door shall be held open by low voltage applied to the continuous duty motor. The control shall include an adjustable safety circuit that monitors door operation and shuts the motor off if an open obstruction is sensed. The control shall include a recycle feature that reopens the door if an obstruction is sensed at any point during its closing cycle. The control shall include a standard three position toggle switch with functions for ON, OFF, and HOLD OPEN.

2.4 ENCLOSURE

- A. Operator shall be completely self-contained within an extruded aluminum housing (alloy 6063-T6) to conceal operator mechanism and mounting brackets and with removable access cover with an overall maximum size of 140 mm (5-1/2 inches) wide by 150 mm (6 inches) deep. Header color shall be integral color anodized/painted to match adjacent storefront/frame finish.

2.5 ACTIVATION DEVICES

- A. Automatic: Opening cycle shall be activated by pressing switches with international symbol of accessibility and "PRESS TO OPERATE DOOR" engraved on the faceplate. Switches shall be installed in a standard 2-gang electrical wall box and placed in a location in compliance with ANSI A117.1. Switches may be wall mounted or mounted on a free standing post or guard rail.
- B. Manual: Push-to-operate; manually pushing the door shall activate the automatic opening cycle. Door shall automatically close after timer delay expires.
- C. Opening and closing force, measured 25 mm (1 inch) out from the lock stile of the door, shall not exceed 67 N (15 lbf) to stop the door when operating in either direction or cycle.
- D. Opening Time: Doors shall be field adjusted so that opening time to back check or 80 degrees, whichever occurs first, shall be 3 seconds or longer as required in Table 1. Backcheck shall not occur before 60 degrees opening.
Total opening time to fully open shall be as in Table II.
- E. Closing Time:
Doors shall be field adjusted to close from 90 degrees to 10 degrees in 3 seconds or longer as required in Table 1.
 - 1. Doors shall be field adjusted to close from 10 degrees to fully close position in not less than 1.5 seconds.

2. Doors shall be field adjusted to remain fully open for not less than 5 seconds.
3. Table 1 provides speed settings for various widths and weights of doors for obtaining results complying with this paragraph.

F. Cycle Tests:

1. Low Energy Power Operated, Low Energy Power Open and Power Assist Operators shall be cycle tested for 300,000 cycles.
2. Use the widest and heaviest door specified as a test specimen. Narrower or lighter doors of the same configurations shall then be considered to meet the cycle test requirements.

Table 1

Minimum Opening Time to Backcheck or 80 degrees, which ever occurs first and the Minimum Closing Time from 90 degrees to Latch Check or 10 degrees.

"D" Door Leaf Width- mm (inches)	"W" Door Weight in kg (pounds) Matrix Values are in seconds				
	(100) 45.4	(56.7) 125	(68.0) 150	(79.4) 175	(90.7) 200
(914) 36	3.0	3.5	3.5	4.0	4.0

Doors of other weights and widths can be calculated using the formula;

$$T = DvW/133 \text{ in US units} \quad T = DvW/2260 \text{ in SI (metric) units}$$

Where: T= Time, seconds

D= Door width, mm (inches)

W= Door weight, kg (lbs)

The values for "T" time have been rounded up to the nearest half second.

These values are based on a kinetic energy of (1.25 lbf-ft).

Table II

Total Opening Time to Full Open Position

Backcheck at 60 degrees	Backcheck at 70 degrees	Backcheck at 80 degrees
Table 1 plus 2 seconds	Table 1 plus 1.5 seconds	Table 1 plus 1 second

Note: To determine maximum times from close to full open, the operator shall be adjusted as shown in the chart. Backcheck occurring at a point between positions in Table II shall use the lowest setting. For example, if the backcheck occurs at 75 degrees, the full open shall be the time shown in Table 1 plus 1.5 seconds.

2.6 POWER UNITS

- A. Provide separate self-contained electric circuits for automatic operators located on each floor of the building. Interruption or failure of power circuits for operators located on one floor of the building shall not interfere with continuous performance of automatic operated doors located on other floors. Capacity and size of power circuits shall be in accordance with automatic operator manufacturer's specifications.

2.7 SAFETY DEVICES

- A. Time delay switches shall be adjustable between 5 to 60 seconds and shall control closing cycle of doors.
- B. Decals with sign "In" or "Do Not Enter" shall be installed on both faces of each door where shown and shall conform to the requirements of ANSI/BHMA A156.19.
- C. Each swing door shall have installed a motion sensor to detect any person standing in the door swing path and prevent the door from opening.
- D. Motion sensors shall consist of detection modules, factory prepared to be attached to each side of the lock/strike stile, an armored flex link power cable and bracket assembly, factory prepared for attachment to the pivot stile; a logic board and a position encoder which shall mount to the operator. The detection modules shall contain transmitting and receiving diodes and sense multidimensional zones for detection of people and/or objects in the door area. Detection modules shall be high impact, shock resistant zinc castings with tinted lenses. The swing door sensor system shall provide complete operate and safety zone

coverage. These zones shall be fully adjusted to meet specific jobsite conditions (sidewalls, adjacent panels, etc.) The system shall not be affected by ultrasonic, ambient light or radios frequencies within the vicinity of the swing door.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment in finish work.
- B. Install power units in locations shown. Where units are to be mounted on walls, provide metal supports or shelves for the units. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.
- C. Operators shall be adjusted and must function properly for the type of traffic (pedestrians) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.
- D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Contracting Officer's Technical Representative.

- - - END - - -

SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies glass, plastic, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

1.2 RELATED WORK

- A. Factory glazed by manufacturer in following units:
1. Hollow Metal Doors: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
 2. Wood Doors: Section 08 14 00, INTERIOR WOOD DOORS.
 3. Aluminum Windows: Section 08 51 13, ALUMINUM WINDOWS.
 4. Mirrors: Section 10 28 00, TOILET, BATH AND LAUNDRY ACCESSORIES.

1.3 LABELS

- A. Temporary labels:
1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
 2. Label in accordance with NFRC (National Fenestration Rating Council) label requirements.
 3. Temporary labels shall remain intact until glass is approved by Contracting Officer's Technical Representative.
- B. Permanent labels:
1. Locate in corner for each pane.
 2. Label in accordance with ANSI Z97.1 and SGCC (Safety Glass Certification Council) label requirements.
 - a. Tempered glass.
 - b. Laminated glass or have certificate for panes without permanent label.

1.4 PERFORMANCE REQUIREMENTS

- A. Building Enclosure Vapor Retarder and Air Barrier:
1. Utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
 2. Maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

B. Glass Design:

1. Load Resistance: Meet requirements of ASTM E1300 and requirements of Contract Documents.
2. Factor of Safety: Minimum design factor of safety for glass shall be as follows:
 - a. Vertical Position: 2.5 (eight lites per thousand breakage maximum at design wind pressure).
 - b. Sloped and Horizontal Position: 5.0.
 - c. Center Deflection: 0.75 inch maximum, based on loading required for glass framing.
3. Glass Sizes: Dimensions of glazing rabbets indicated by Contract Documents are intended to provide for minimum bite on glass and minimum edge clearance under positive and negative wind loads, dead and live loads, vertical deflections, seismic forces, solar loads, temperature changes and impact loading for operating sash and doors, and adequate thicknesses for accessory glazing materials, with reasonable tolerances. Provide correct glass size, including bite on glass and edge clearances, for each opening, within established tolerances and dimensions and meeting performance requirements.

C. Glass Thickness:

1. Select thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with ASCE 7 or local applicable codes, whichever is more stringent.
2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
3. Test in accordance with ASTM E 330.
4. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.

D. Safety Glass:

1. General: Where safety glass is indicated by Contract Documents or required by codes and regulations of public authorities having jurisdiction over the Work, provide products which meet requirements of ANSI Z97.1 and CPSC 16CFR1201, Category II materials.
2. Label: Provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other

certification agency acceptable to authorities having jurisdiction over the Work.

3. Location: Provide safety glass in light openings of doors and door sidelights, and in other locations required by Contract Documents and as required by safety glazing regulations of public authorities having jurisdiction over the Work. In case of conflict, more stringent requirements shall govern.

1.5 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Certificates:
 1. Certificates stating that wire glass, meets requirements for safety glazing material as specified in ANSI Z97.1.
 2. Certificate on shading coefficient.
 3. Certificate on "R" value when value is specified.
- C. Warranty: Submit written guaranty, conforming to General Condition requirements, and to "Warranty of Construction" Article in this Section.
- D. Manufacturer's Literature and Data:
 1. Glass, each kind required.
 2. Insulating glass units.
 3. Elastic compound for metal sash glazing.
 4. Putty, for wood sash glazing.
 5. Glazing cushion.
 6. Sealing compound.
- E. Samples:
 1. Size: 150 mm by 150 mm (6 inches by 6 inches).
 2. Glass Types: Provide samples of each type:
 - a. Insulated glass unit.
 - b. Interior tempered glass
- F. Preconstruction Adhesion and Compatibility Test Report: Submit glazing sealant manufacturer's test report indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.
- B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.
- C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

1.8 WARRANTY

- A. Warranty: Conform to terms of "Warranty of Construction", FAR clause 52.246-21, except extend warranty period for the following:
 - 1. Coated Glass: 10 years.
 - 2. Tempered Glass: 5 years.

1.9 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 National Standards Institute (ANSI):
 - Z97.1-04.....Safety Glazing Material Used in Building -
Safety Performance Specifications and Methods
of Test
- C. American Society for Testing and Materials (ASTM):
 - C1363-05.....Thermal Performance of Building Assemblies, by
Means of A Hot Box Apparatus
 - C542-05.....Lock-Strip Gaskets
 - C716-06.....Installing Lock-Strip Gaskets and Infill
Glazing Materials
 - C864-05.....Dense Elastomeric Compression Seal Gaskets,
Setting Blocks, and Spacers
 - C920-05.....Elastomeric Joint Sealants
 - C1036-06.....Flat Glass

- C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated
and Uncoated Glass
- C1172-03.....Laminated Architectural Flat Glass
- C1376-03.....Pyrolytic and Vacuum Deposition Coatings on
Flat Glass
- D635-06.....Rate of Burning and/or Extent and Time of
Burning of Self-Supporting Plastic in a
Horizontal Position
- E84-08.....Surface Burning Characteristics of Building
Materials.
- E330-02.....Structural Performance of Exterior Windows,
Curtain Walls, and Doors by Uniform Static Air
Pressure Difference
- E2190-08.....Insulating Glass Unit
- D. Code of Federal Regulations (CFR):
- 16 CFR 1201.....Safety Standard for Architectural Glazing
Materials; 1977, with 1984 Revision.
- E. Glazing Association of North America (GANA):
- GANA.....Glazing Manual
- FGMA.....Sealant Manual
- F. National Fenestration Rating Council (NFRC): Certified Products
Directory (Latest Edition)
- G. Safety Glazing Certification Council (SGCC): Certified Products
Directory (Issued Semi-Annually)
- H. Unified Facilities Criteria (UFC):
- 4-010-01-2007.....DOD Minimum Antiterrorism Standards for
Buildings

PART 2 - PRODUCT

2.1 GLASS

- A. Use thickness stated unless specified otherwise in assemblies.
- B. Clear Glass:
1. ASTM C1036, Type I, Class 1, Quality q3.
 2. Types:
 - a. Glass G-1A: Clear float glass, annealed minimum, 5mm (3/16 inch).
 - b. Glass G-1B: Clear float glass, annealed minimum, 6mm (1/4 inch).

2.2 HEAT-TREATED GLASS

A. Clear Heat Strengthened Glass:

1. ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
2. Types:
 - a. Glass G-1C: Clear float glass, heat strengthened minimum, 5mm (3/16 inch).
 - b. Glass G-1D: Clear float glass, heat strengthened minimum, 6mm (1/4 inch).

B. Clear Tempered Glass:

1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
2. Types:
 - a. Glass G-1E: Clear float glass, tempered, safety glass, 5mm (3/16 inch).
 - b. Glass G-1F: Clear float glass, tempered, safety glass, 6mm (1/4 inch).
 - c. Glass G-1G: Clear float glass, tempered, safety glass, 12mm (1/2 inch).
 - d. Glass G-1H: Clear float glass, tempered minimum 10 mm (3/8 inch).

2.3 COATED GLASS

- A. Low-E Glass: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects, for scope of work and glass types associated with window replacement information.
- B. Ceramic Coated Vision Glass: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects, for scope of work and glass types associated with window replacement.
- C. Ceramic Coated Spandrel Glass: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects, for scope of work and glass types associated with window replacement.

2.4 INSULATING GLASS UNITS

- A. General: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects, for scope of work and glass types associated with window replacement.

2.5 GLAZING ACCESSORIES

- A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work shall have a finish that will not corrode or stain while in service.
- B. Setting Blocks: ASTM C864:
 - 1. Channel shape; having 6 mm (1/4 inch) internal depth.
 - 2. Shore a hardness of 80 to 90 Durometer.
 - 3. Block lengths: 50 mm (two inches) except 100 to 150 mm (four to six inches) for insulating glass.
 - 4. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
 - 5. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.
- C. Spacers:
 - 1. ASTM C864.
 - 2. Channel shape having a 6 mm (1/4 inch) internal depth.
 - 3. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
 - 4. Lengths: One to 25 to 76 mm (one to three inches).
 - 5. Shore a hardness of 40 to 50 Durometer.
- D. Sealing Tapes:
 - 1. Semi-solid polymeric based material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
 - 2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.
- E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops for use in hollow metal frames with stops.
- F. Glazing Clips: Galvanized steel spring wire designed to hold glass in position in rabbeted sash without stops, when glazing in wood frames.
- G. Glazing Gaskets: ASTM C864:
 - 1. Firm dense wedge shape for locking in sash.
 - 2. Soft, closed cell with locking key for sash key.
 - 3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.

- 4. Gasket shall be compatible with silicone sealant.
- H. Glazing Sealants: ASTM C920, silicone neutral cures, non-skinning:
 - 1. Type S.
 - 2. Class 25
 - 3. Grade NS.
 - 4. Shore A hardness of 25 to 30 Durometer.
- I. Structural Sealant: ASTM C920, silicone acetoxo cure:
 - 1. Type S.
 - 2. Class 25.
 - 3. Grade NS.
 - 4. Shore a hardness of 25 to 30 Durometer.
- J. Neoprene or EPDM, Glazing Gasket: ASTM C864.
 - 1. Channel shape; flanges may terminate above the glazing channel or flush with the top of the channel.
 - 2. Designed for dry glazing.
- K. Color:
 - 1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames shall match color of the finished aluminum and be nonstaining.
 - 2. Color of other glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted shall be black, gray, or neutral color.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 - 1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.
 - 2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer's approved shop drawings.
- B. Advise Contractor of conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation: Do not proceed with installation until unsatisfactory conditions have been corrected.

- C. Verify that wash down of adjacent masonry is completed prior to erection of glass and glazing units to prevent damage to glass and glazing units by cleaning materials.

3.2 PREPARATION

- A. For sealant glazing, prepare glazing surfaces in accordance with GANA-02 Sealant Manual.
- B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.
- C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.
- D. Verify that components used are compatible.
- E. Clean and dry glazing surfaces.
- F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

3.3 INSTALLATION - GENERAL

- A. Install in accordance with GANA-01 Glazing Manual and GANA-02 Sealant Manual unless specified otherwise.
- B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.
- C. Set glazing without bending, twisting, or forcing of units.
- D. Do not allow glass to rest on or contact any framing member.
- E. Glaze doors and operable sash, in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.
- F. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.
- G. Insulating Glass Units:
 - 1. General: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects.
 - 2. Glaze in compliance with glass manufacturer's written instructions.
 - 3. When glazing gaskets are used, they shall be of sufficient size and depth to cover glass seal or metal channel frame completely.
 - 4. Do not use putty or glazing compounds.
 - 5. Do not grind, nip, cut, or otherwise alter edges and corners of fused glass units after shipping from factory.
 - 6. Install with tape or gunnable sealant in wood sash.

3.4 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

- A. Cut glazing tape and gasket spline to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.
- B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Trim protruding tape edge.

3.5 INSTALLATION - WET METHOD (SEALANT AND SEALANT)

- A. Place setting blocks at 1/4 points and install glazing pane or unit.
- B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.
- C. Fill gaps between glazing and stops with silicone type sealant to depth of bite on glazing, but not more than 9 mm (3/8 inch) below sight line to ensure full contact with glazing and continue the air and vapor seal.
- D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.6 REPLACEMENT AND CLEANING

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Contracting Officer's Technical Representative.
- B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.
- C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.7 PROTECTION

- A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

3.8 GLAZING SCHEDULE

A. General: Each glass type is indicated in this Section by a designation. Glazing designations specified in this Section correspond to designations indicated in Drawings. Locations of glazing types are as indicated in Drawings.

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SECTION 08 90 00
LOUVERS AND VENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies fixed wall louvers, louver screens and blank-off panels.

1.2 RELATED WORK

- A. Louvers in Unit Masonry: Section 04 20 00, UNIT MASONRY.

1.3 PERFORMANCE REQUIREMENTS

- A. Performance Conditions: Performance of work shall include live loads, creep, shrinkage, deflections, temperature variations, stresses, expansion and contraction requirements, seismic forces, and other like conditions meeting most stringent requirements of Contract Documents and of codes and regulations of public authorities having jurisdiction over the Work without evidencing permanent deformation of louver components, including frame, supports and blades, and metal fatigue and noise caused by louver blade rattle or flutter.
- B. Loading: Work shall withstand a minimum uniform pressure, both positive (acting inward) and negative (acting outward), acting normal to plane and over gross area of surfaces of uniform static air pressure of 1.4 kPa (30 psf) minimum, without exceeding deflection requirements.
- C. Deflections: For required pressures and loads, limit deflections and stresses to wall louver work as follows, except restrict deflection further as required for performance and assembly of components:
1. Normal: For both positive and negative pressures and loads acting normal to plane of louvers, deflecting of framing members or components shall not exceed $L/240$ of span length.
 2. Interaction Stresses: Stresses shall take into account interaction, including allowable values established by industrial standards. In no case shall allowable values exceed yield stress.
- D. Movements: Work shall accommodate following, without damage, overstressing, buckling, undue stress on supporting elements, deterioration, opening up of joints beyond allowable tolerances, failure of joint seals, reduction of performance and other detrimental effects to system, components and seals:
1. Movement of structural support framing and related structural elements, including dead load and live load deflections, lateral load movements, thermal movements, and creep and shrinkage movements.

Structure deflections will be furnished by Architect upon written request.

2. Dynamic loadings and release of loads.
 3. Movement within system.
 4. Movement between system and framing components.
 5. Expansion and contraction of outdoor components as will be caused by material temperature range of 82 C(180 F) minimum, including actual material temperatures due to both summer daytime direct solar heat gain and winter nighttime heat loss, with normal function and no failure of associated construction. Movement shall be noiseless.
 6. Fabrication and erection tolerances.
- E. Design Configuration: Outdoor louvers, and indoor louvers located in same room or space, each shall be of one design type, except as otherwise indicated by Contract Documents.
- F. Performance:
1. General: Provide louvers based on performance requirements of AMCA 500-L for air performance, water penetration, air leakage, and wind driven rain ratings as applicable, demonstrated by testing louvers of manufacturer identical to louvers required by Contract Documents; determined by testing 1200 mm wide by 1200 mm high (48 inch wide by 48 inch high) (gross area) core area louver unit.
 2. Free Area: Free air area of louvers shall be such as not to reduce design air movement through louvers and not to generate noise from design volume of air passing through louvers. Free air area of louvers shall be calculated meeting requirements of AMCA 500-L. Free area shall be 50 percent minimum of gross area, except as otherwise required by Contract Documents.
 3. Outdoor Louvers - Drainable Blade: Each louver located in outdoor wall shall meet requirements of AMCA 500-L and AMCA Certification Ratings Program, and bear AMCA Certified Rating Seal, except as otherwise indicated by Contract Documents.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
1. Each type, showing material, finish, size of members, method of assembly, and installation and anchorage details.
- C. Manufacturer's Literature and Data:
1. Each type of louver and vent.

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. The Master Painters Institute (MPI):
Approved Product List - November 2007
- C. American Society for Testing and Materials (ASTM):
A1008/A1008M REV A-07...Steel, Sheet, Carbon, Cold Rolled, Structural, and High Strength Low-Alloy with Improved Formability
B209/B209M-07.....Aluminum and Aluminum Alloy, Sheet and Plate
B221-06.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
B221M-07.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire Shapes, and Tubes
- D. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-505 (1988).....Metal Finishes Manual
- E. National Fire Protection Association (NFPA):
90A-02.....Installation of Air Conditioning and Ventilating Systems
- F. American Architectural Manufacturers Association (AAMA):
605-98.....High Performance Organic Coatings on Architectural Extrusions and Panels
- G. Air Movement and Control Association, Inc. (AMCA):
500-L-99.....Testing Louvers

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum, Extruded: ASTM B221/B221M.
- B. Carbon Steel: ASTM A1008/A1008M.
- C. Aluminum, Plate and Sheet: ASTM B209/B209M.
- D. Fasteners: Fasteners for securing louvers to adjoining construction, except as otherwise specified or shown, shall 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 shall be of stainless steel or aluminum.

E. Inorganic Zinc Primer: MPI No. 19.

2.2 EXTERIOR WALL LOUVERS

A. General:

1. Provide fixed type louvers of size and design shown.
2. Heads, sills and jamb sections shall have formed caulking slots or be designed to retain caulking. Head sections shall have exterior drip lip, and sill sections an integral water stop.
3. Furnish louvers with sill extension or separate sill as shown.
4. Frame shall be mechanically fastened or welded construction with welds dressed smooth and flush.

B. Wall Louver LVR-1 - Horizontal Drainable Fixed Blade Louver:

1. Type: Box type horizontal drainable fixed blade louver with gutters in blades and corresponding drainage channels (downspouts) in each jamb. Frames and blades of type, construction, configuration and performance required, with supporting framework concealed from view from outside face of louver by placing braces, and brackets on inside face.
2. Construction: Extruded aluminum.
3. Configuration:
 - a. Louver Depth: 100 mm (4 inches).
 - b. Frame Type: Inverted channel type, conventional configuration with flanges projecting outward from blade area. Provide with integral drainage channels (downspouts), sill flashing and perimeter calking slots. Single louver frames shall not exceed 1700 mm (66 inches) wide. When openings exceed 1700 mm (66 inches), provide twin louvers separated by mullion members.
 - c. Blade Profile: Z-profile with gutters.
 - d. Blade Angle: 45 degrees approximately.
 - e. Frame and Blade Thickness: 0.081 inch minimum.
4. Performance: Meet requirements of Article - Performance Requirements, of this Section, and following and shall bear AMCA Certified Rating Seal:
 - a. Free Area: 50 percent minimum of gross area.
 - b. Static Pressure Loss: 0.15 inch water gage maximum at free area intake velocity of 650 feet per minute maximum or exhaust velocity of 900 feet per minute maximum when evaluated meeting requirements of AMCA 500-L, air performance procedures.

- c. Water Penetration: Beginning point of water penetration at 0.01 ounces per square foot maximum free area at intake velocity of 650 feet per minute maximum for duration of 15 minutes when evaluated meeting requirements of AMCA 500-L, water penetration procedures.
- 5. Performance Certification: AMCA 511 for air performance and water penetration performance.

2.3 CLOSURE ANGLES AND CLOSURE PLATES

- A. Fabricate from 2 mm (0.074-inch) thick 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 specified.

2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening.
- B. Secure screens to louver frames with stainless steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded aluminum screen frames at corners with clips.
 - 2. Finish: Same finish as louver frames to which louver screens are attached.
 - 3. Type: Non-rewirable, U-shaped frames for permanently securing screen mesh.
- D. Bird Screening for Aluminum Louvers:
 - 1. Bird Screening: Aluminum, 1/2 inch square mesh, 0.063 inch wire.

2.5 BLANK-OFF PANELS

- A. Insulated, Blank-Off Panels: Laminated metal-faced panels consisting of insulating core surfaced on back and front with metal sheets.
 - 1. Thickness: 1 inch.
 - 2. Metal Facing Sheets: Aluminum sheet, not less than 0.032 inch nominal thickness.
 - 3. Insulating Core: Foamed-plastic rigid insulation board.
 - 4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturers standard extruded aluminum channel frames, not less than 0.080 inch nominal thickness, with corners mitered and with same finish as panels.

5. Seal perimeter joints between panel faces and louver frames with 1/8 inch by 1 inch PVC compression gaskets.
6. Panel Finish: Same finish applied to louvers.
7. Attach blank-off panels to back of louver frames with stainless steel, sheet metal screws.

2.6 FINISH

- A. In accordance with NAAMM Metal Finishes Manual: AMP 500-505
- B. Finish Schedule:
 1. Aluminum Louvers: Fluorocarbon finish.
 2. Bird Screens: Mill finish.
 3. Blank-Off Panels: Fluorocarbon finish.
- C. Mill Finish: AA-MIX, mill finish, as fabricated.
- D. Fluorocarbon Finish: Polyvinylidene fluoride (PVDF) finish shall be high performance, heavy duty, resin finish system. Finish coats shall contain 70 percent minimum by weight of PVDF resin, Arkema Inc., Kynar 500, or Solvay Solexis, Hylar 5000.
 1. Performance: Finish system shall meet requirements of AAMA 2605.2 and for 20 years minimum period service life shall not chalk more than ASTM D4214, Method A, Number 8 Rating, not change color more than 5 Δ E Hunter units when evaluated meeting requirements of ASTM D2244, and not check, craze or peel. In addition, finish system shall meet performance requirements and data indicated in current system specifications of specified finish manufacturer.
 2. Applications:
 - a. Coil: Use coil application finish system for steel sheet substrates.
 - b. Spray: Use spray application finish system for extrusion substrates.
 3. Color:
 - a. Building 200S: Match color of adjacent precast construction as acceptable to Owner and Architect.
 - b. Building 12: Match color of adjacent construction as acceptable to Owner and Architect.
 4. Texture: Smooth finish.

2.7 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 paint (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 is not approved.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Set work accurately, in alignment and where shown. Items shall be 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. Generally, 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.

3.2 CLEANING AND ADJUSTING

- A. After installation, all exposed prefinished and plated items and all items fabricated from stainless steel and aluminum shall be cleaned as recommended by the manufacturer and protected from damage until completion of the project.
- B. All movable parts, including hardware, shall 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

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SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

1.2 RELATED WORK

- A. Load bearing framing: Section 05 40 00, COLD-FORMED METAL FRAMING.
- B. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.
- C. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS and Section 09 29 00, GYPSUM BOARD.

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. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.
- C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

1.4 SUBMITTALS

- A. Submit in accordance with: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Studs, runners and accessories.
 - 2. Hanger inserts.
 - 3. Channels (Rolled steel).
 - 4. Furring channels.
 - 5. Screws, clips and other fasteners.
- C. Shop Drawings:
 - 1. Typical ceiling suspension system.
 - 2. Typical metal stud and furring construction system including details around openings and corner details.
 - 3. Typical shaft wall assembly

4. Typical fire rated assembly and column fireproofing showing details of construction same as that used in fire rating test.

D. Test Results: Fire rating test designation, each fire rating required for each assembly.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. 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)

A123-09.....Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products

A653/A653M-09.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire

C11-09.....Terminology Relating to Gypsum and Related Building Materials and Systems

C635-07.....Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings

C636-08.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

C645-08.....Non-Structural Steel Framing Members

C754-08.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

C841-03(R2008).....Installation of Interior Lathing and Furring

C954-07.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

E580-08.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint.

C. Ceilings and Interior Systems Construction Association (CISCA): Ceiling Systems Handbook for installation of gypsum board ceilings.

D. Gypsum Association (GA):

GA-201.....Using Gypsum Board for Walls and Ceilings, for
installation of steel framing for gypsum board.

PART 2 - PRODUCTS**2.1 PROTECTIVE COATING**

- A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G-60 minimum, per ASTM 123.

2.2 STEEL STUDS AND RUNNERS (TRACK)

- A. ASTM C645, modified for thickness specified and sizes as shown.
 - 1. Use ASTM A525 steel, 0.8 mm (0.0329-inch) thick bare metal (33 mil).
 - 2. Runners same thickness as studs.
- 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 3600 mm (12 feet) or less in length shall be in one piece.
- E. Shaft Wall Framing:
 - 1. Conform to rated wall construction.
 - 2. C-H Studs.
 - 3. E Studs.
 - 4. J Runners.

2.3 FURRING CHANNELS

- A. Rigid furring channels (hat shape): ASTM C645.
- B. Resilient furring channels:
 - 1. Not less than 0.45 mm (0.0179-inch) thick bare metal.
 - 2. Semi-hat shape, only one flange for anchorage with channel web leg slotted on anchorage side, channel web leg on other side stiffens fastener surface but shall not contact anchorage surface other channel leg is attached to.
- C. "Z" Furring Channels:
 - 1. Not less than 0.45 mm (0.0179-inch)-thick bare metal, with 32 mm (1-1/4 inch) and 19 mm (3/4-inch) flanges.
 - 2. Web furring depth to suit thickness of insulation with slotted perforations.
- D. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

2.4 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. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.
- F. Tie Wire and Hanger Wire:
 - 1. ASTM A641, soft temper, Class 1 coating.
 - 2. Gage (diameter) as specified in ASTM C754 or ASTM C841.
- G. Attachments for Wall Furring:
 - 1. 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.
- H. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

2.5 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)

- A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.
- B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

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. 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.
- G. 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.
- H. 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).
- I. 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.
- J. 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 INSTALLING SHAFT WALL SYSTEM

- A. Conform to UL Design No. U438 for two-hour fire rating. B. Position J runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports with power driven fasteners at both ends and 600 mm (24 inches) on center.
- B. After liner panels have been erected, cut C-H studs and E studs, from 9 mm (3/8-inch) to not more than 13 mm (1/2-inch) less than floor-to-ceiling height. Install C-H studs between liner panels with liner panels inserted in the groove.
- C. Install full-length steel E studs over shaft wall line at intersections, corners, hinged door jambs, columns, and both sides of closure panels.
- D. Suitably frame all openings to maintain structural support for wall:
 - 1. Provide necessary liner fillers and shims to conform to label frame requirements.
 - 2. Frame openings cut within a liner panel with E studs around perimeter.
 - 3. Frame openings with vertical E studs at jambs, horizontal J runner at head and sill.

3.6 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS

- A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for plaster ceilings or soffits.
 - 1. Space framing at 400 mm (16-inch) centers for metal lath anchorage.
 - 2. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.
- B. Existing concrete construction exposed:
 - 1. Use power actuated fasteners either eye pin, threaded studs or drive pins for type of hanger attachment required.
 - 2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists. //
- C. Installing suspended ceiling system for gypsum board (ASTM C635 Option):
 - 1. Install only for ceilings to receive screw attached gypsum board.
 - 2. Install in accordance with ASTM C636.
 - a. Install main runners spaced 1200 mm (48 inches) on center.
 - b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.
 - c. Install wall track channel at perimeter.

D. Installing Ceiling Bracing System:

1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and over head construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.
3. Brace suspended ceiling or soffit framing in seismic areas in accordance with ASTM E580.

3.7 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 - - -

SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

B. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

1.3 PERFORMANCE REQUIREMENTS

A. General: Work shall meet performance requirements indicated by Contract Documents, including requirements specified in this Paragraph and in other parts of this Section.

1. Loading: Provide gypsum board systems designed and tested by manufacturer to withstand a uniform lateral load perpendicular to surface and allowable deflection as follows:

a. Indoor Stud Walls and Partitions - General: Uniform lateral load (air pressure) of 5 psf minimum and allowable deflection of L/240 maximum based on supported span of wall or partition and stud type, size and spacing, except as otherwise indicated by Contract Documents.

b. Indoor Stud Walls and Partitions - With Applied Finish Materials: Uniform lateral load (air pressure) of 5 psf minimum and allowable deflection of L/360 maximum based on supported span of wall and framing type, size and spacing, except when to receive only paint or wallcovering.

c. Indoor Ceilings: Uniform load of 5 psf minimum and allowable deflection of L/360 maximum based on supported span of ceiling and framing type, size and spacing.

2. Isolation: Isolate non-load bearing walls and partitions from transfer of structural loading from building structural components, such as decks, railing and vertical structural elements, both horizontally and vertically. Provide slip or cushion type joints of dimension and detail to obtain support meeting performance loading requirements and to prevent building structure load transfer.

a. Isolate perimeter of board materials of non-load bearing walls and partitions at abutment with building structural components.

- b. Provide 1/4 inch minimum to 1/2 inch minimum gap at ceiling runner between gypsum board and structure. Provide greater gap dimension as required to prevent transfer of loads from building structure to gypsum board.
 - c. Finish edges of face layer with J-type casing bead. Seal space between casing bead and surface with continuous uniform bead of acoustical sealant, except as otherwise required for fire rated assemblies.
 - d. Attach gypsum board to studs 1/2 inch minimum below bottom edge of ceiling running flange and to first stud adjacent to vertical runner. Do not attach board to runners or in any manner which creates structural transfer of load to wall.
- B. Fire Resistance Rating:
- 1. Where gypsum board assemblies are indicated for fire resistance ratings, including those required to meet regulations of public authorities having jurisdiction over the Work, provide materials and installation identical with applicable assemblies which have been evaluated meeting requirements of ASTM E119 and listed by recognized authorities, including UL and FM.
 - 2. Provide fire resistance rated assemblies identical to those indicated by reference to GA File Numbers in GA-600 - Fire Resistance Design Manual or to design designations in UL - Fire Resistance Directory.

1.4 TERMINOLOGY

- A. Definitions and description of terms shall be in accordance with ASTM C11, C840, 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 the trusses or bar joists.
- C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.5 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. Laminating adhesive.
 - 4. Gypsum board, each type.

C. Shop Drawings:

1. Typical gypsum board installation, showing corner details, edge trim details and the like.
2. Typical sound rated assembly, showing treatment at perimeter of partitions and penetrations at gypsum board.
3. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

D. Samples:

1. Cornerbead.
2. Edge trim.
3. Control joints.

E. Test Results:

1. Fire rating test, each fire rating required for each assembly.
2. Sound rating test.

1.6 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

- A. In accordance with the requirements of ASTM C840.

1.7 ENVIRONMENTAL CONDITIONS

- A. In accordance with the requirements of ASTM C840.

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. 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 |
| C919-08..... | Sealants in Acoustical Applications |
| C954-07..... | Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness |
| C1002-07..... | Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs |
| C1047-05..... | Accessories for Gypsum Wallboard and Gypsum Veneer Base |
| C1658-06..... | Glass Mat Gypsum Panels |
| C1396-06..... | Gypsum Board |

E84-08.....Surface Burning Characteristics of Building
Materials

C. Ceilings and Interior Systems Construction Association (CISCA): Ceiling
Systems Handbook, for installation of gypsum board ceilings.

D. Gypsum Association (GA):

GA-216.....Application and Finishing of Gypsum Panel
Products

GA-214.....Recommended Levels of Gypsum Board Finish

E. Underwriters Laboratories Inc. (UL):

Latest Edition.....Fire Resistance Directory

F. Inchcape Testing Services (ITS):

Latest Editions.....Certification Listings

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. General: Work shall meet performance requirements indicated by Contract Documents, including requirements specified in this Paragraph and in other parts of this Section.

1. Loading: Provide gypsum board systems designed and tested by manufacturer to withstand a uniform lateral load perpendicular to surface and allowable deflection as follows:

a. Indoor Stud Walls and Partitions - General: Uniform lateral load (air pressure) of 5psf minimum and allowable deflection of L/240 maximum based on supported span of wall or partition and stud type, size and spacing, except as otherwise indicated by Contract Documents.

b. Indoor Ceilings: Uniform load of 5psf minimum and allowable deflection of L/360 maximum based on supported span of ceiling and framing type, size and spacing.

2. Isolation: Isolate non-load bearing walls and partitions from transfer of structural loading from building structural components, such as decks, railing and vertical structural elements, both horizontally and vertically. Provide slip or cushion type joints of dimension and detail to obtain support meeting performance loading requirements and to prevent building structure load transfer.

a. Isolate perimeter of board materials of non-load bearing walls and partitions at abutment with building structural components.

- b. Provide 1/4 inch minimum to 1/2 inch minimum gap at ceiling runner between gypsum board and structure. Provide greater gap dimension as required to prevent transfer of loads from building structure to gypsum board.
 - c. Finish edges of face layer with J-type casing bead. Seal space between casing bead and surface with continuous uniform bead of acoustical sealant, except as otherwise required for fire rated assemblies.
 - d. Attach gypsum board to studs 1/2 inch minimum below bottom edge of ceiling running flange and to first stud adjacent to vertical runner. Do not attach board to runners or in any manner which creates structural transfer of load to wall.
- B. Fire Resistance Rating:
- 1. Where gypsum board assemblies are indicated for fire resistance ratings, including those required to meet regulations of public authorities having jurisdiction over the Work, provide materials and installation identical with applicable assemblies which have been evaluated meeting requirements of ASTM E119 and listed by recognized authorities, including UL and FM.
 - 2. Provide fire resistance rated assemblies identical to those indicated by reference to GA File Numbers in GA-600 - Fire Resistance Design Manual or to design designations in UL - Fire Resistance Directory.

2.2 GYPSUM BOARD

- A. Moisture and Mold Resistant Gypsum Board: ASTM C1396, Type X, 16mm (5/8 inch) thick, moisture and mold resistant gypsum core with heavy duty paper surfacing on faces; for indoor applications, including substrate for tile, paint, finishes, wall coverings and like decorations, and unfinished work. Board shall be resistant to intermittent moisture and humidity exposure and growth of mold when evaluated meeting requirements of ASTM D3273, Panel Score 8 average.
- B. Flexible Gypsum Board: ASTM C1396, 6mm (1/4 inch) thick, regular gypsum board capable of being bent to fit tight radii and be more flexible than regular gypsum board without wetting.
- C. Impact, Moisture and Mold Resistant Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick, noncombustible, moisture and mold resistant gypsum core with heavy duty, abrasion resistant paper surfacing on front face and heavy duty paper surfacing on back face with fiberglass mesh reinforcement close to back face of board, for indoor applications, including substrate for small format tile, paint finishes, wall coverings and like decoration, and unfinished work, requiring resistance

to high energy or continual impact than standard gypsum board. Abuse resistance shall meet requirements of ASTM C1629, Classification Level 3 - Heavy Duty. Board shall be resistant to intermittent moisture and humidity exposure, and growth of mold when evaluated meeting requirements of ASTM D3273, Panel Score 8 average minimum.

- D. Tile and Paint Impact Resistant Gypsum Board: ASTM C1278, Type X, 16mm (5/8 inch) thick; with moisture and mold resistant gypsum and cellulose core, and paperless faces that finishes same as paper faced gypsum board; for indoor applications, including substrate for tile, large format paver tile, paint finishes, wall coverings and like decoration and unfinished work; and work requiring resistant to high energy or continual impact. Abuse resistance shall meet requirements of ASTM C1629, Classification Level 3 - Heavy Duty. Board shall be resistant to consistent moisture and humidity exposure and growth of mold when evaluated meeting requirements of ASTM D3273, Panel Score 10 average minimum.
- E. Recycled Content: Gypsum cores shall contain a minimum of 95 percent post industrial recycled gypsum content. Paper facings shall contain 100 percent post-consumer recycled paper content.

2.3 ACCESSORIES

- A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet or rigid PVC plastic.
- B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

2.4 FASTENERS

- A. ASTM C1002 and ASTM C840, except as otherwise specified.
- B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).
- C. Select screws of size and type recommended by the manufacturer of the material being fastened.
- D. For fire rated construction, type and size same as used in fire rating test.
- E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE

- A. ASTM C475 and ASTM C840, free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

PART 3 - EXECUTION**3.1 GYPSUM BOARD HEIGHTS**

- A. Extend all layers of gypsum board from floor to underside of structure overhead on following partitions and furring:
 - 1. Two sides of partitions:
 - a. Fire rated partitions.
 - b. Smoke partitions.
 - c. Sound rated partitions.
 - d. Full height partitions shown (FHP).
 - e. Corridor partitions.
 - 2. One side of partitions or furring:
 - a. Inside of exterior wall furring or stud construction.
 - b. Room side of room without suspended ceilings.
 - c. Furring for pipes and duct shafts, except where fire rated construction is shown.
 - 3. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead, unless shown otherwise.
- B. In locations other than those specified, extend gypsum board from floor to heights as follows:
 - 1. Not less than 100 mm (4 inches) above suspended acoustical ceilings.
 - 2. At ceiling of suspended gypsum board ceilings.
 - 3. At existing ceilings.

3.2 INSTALLING GYPSUM BOARD

- A. Coordinate installation of gypsum board with other trades and related work.
- B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
- C. Moisture and Mold-Resistant Glass Mat Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in locations which might be subject to moisture exposure during construction.
- D. Tile and Paint Impact Resistant Gypsum Board: Provide and install tile and paint type impact resistant gypsum board for all gypsum board surfaces to receive rigid finish material such as ceramic/porcelain tile finish, and rigid applied wall base finishes.

- E. Impact, Moisture and Mold Resistant Gypsum Board: Provide and install impact, moisture and mold resistant gypsum board up to 1200 mm (4 feet) above finish floor at all indoor locations to receive painted gypsum board finish.
- F. Use gypsum boards in maximum practical lengths to minimize number of end joints.
- G. Bring gypsum board into contact, but do not force into place.
- H. 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.
- I. Walls (Except Shaft Walls):
 - 1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
 - 2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
 - 3. Stagger screws on abutting edges or ends.
 - 4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
 - 5. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
 - 6. For three-ply gypsum board assemblies, apply plies in same manner as for two-ply assemblies, except that heads of fasteners need only be driven flush with surface for first and second plies. Apply third ply of wallboard in same manner as second ply of two-ply assembly, except use fasteners of sufficient length enough to have the same penetration into framing members as required for two-ply assemblies.
 - 7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
 - 8. Control Joints ASTM C840 and as follows:

- a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
 - b. Not required for wall lengths less than 9000 mm (30 feet).
 - c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.
- J. Acoustical or Sound Rated Partitions, Fire and Smoke Partitions:
- 1. Cut gypsum board for a space approximately 3 mm to 6 mm (1/8 to 1/4 inch) wide around partition perimeter.
 - 2. Coordinate for application of caulking or sealants to space prior to taping and finishing.
 - 3. For sound rated partitions, use sealing compound (ASTM C919) to fill the annular spaces between all receptacle boxes and the partition finish material through which the boxes protrude to seal all holes and/or openings on the back and sides of the boxes. STC minimum values as shown.
- K. 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.
 - d. Where shown.

3.3 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840.
 - 1. Exposed Surfaces: Use Level 5 finish for all gypsum board exposed and open to public view.

2. Concealed Surfaces: Use Level 2 finish for all gypsum board concealed and not open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:
 1. Gypsum board is fastened and held close to framing or furring.
 2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.
- C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non decorated fire rated and sound rated gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, fire rated and sound rated construction/ Sanding is not required of non decorated surfaces.

3.4 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction.

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SECTION 09 30 13
CERAMIC/PORCELAIN TILING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies ceramic and porcelain tile, marble thresholds, and waterproofing and crack isolation membranes for thin-set applications.
- B. Schedule: Required types and applications of tiling include, but are not limited to, materials and application locations specified in Article - Tile Schedule at the end of this Section.

1.2 RELATED WORK

- A. Preformed sealant joints in tile flooring: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.
- B. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.
- C. Gypsum Board Substrate to Receive Tile and Paint Type Ceramic and Porcelain Tiling: Section 09 29 00, GYPSUM BOARD.
- D. Metal and Resilient Edge Strips at Joints With New Carpeting: Section 09 68 00, CARPETING.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
 - 1. Porcelain and ceramic tile, each type, color, patterns and size.
 - 2. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.
 - 3. Grout, each type and color.
- C. Product Data:
 - 1. Ceramic, and porcelain tile, marked to show each type, size, and shape required.
 - 2. Epoxy Grout.
 - 3. Divider strip.
 - 4. Reinforcing tape.
 - 5. Leveling compound.
 - 6. Latex-Portland cement mortar and grout.
 - 7. Organic adhesive.
 - 8. Waterproofing and crack isolation membrane.
 - 9. Fasteners.

D. Certification:

1. Master grade, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
 - a. Modified epoxy emulsion.
 - b. Reinforcing tape.
 - c. Latex-Portland cement mortar and grout.
 - d. Leveling compound.
 - e. Organic adhesive.
 - f. Waterproof isolation membrane.

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. American National Standards Institute (ANSI):
 - A10.20-05.....Safety Requirements for Ceramic Tile, Terrazzo, and Marble Works
 - A108.4-05.....Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesives
 - A108.5-05.....Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
 - A108.6-05.....Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy
 - A108.10-05.....Installation of Grout in Tilework
 - A108.13-05.....Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone
 - A118.3-05.....Chemical Resistant, Water Cleanable Tile-Setting Epoxy and Water Cleanable Tile-Setting and Grouting Epoxy Adhesive
 - A118.4-05.....Latex-Portland Cement Mortar
 - A118.6-05.....Standard Cement Grouts for Tile Installation

- A118.10-05.....Load Bearing, Bonded, Waterproof Membranes for
Thin-Set Ceramic Tile and Dimension Stone
Installation
- A136.1-05.....Organic Adhesives for Installation of Ceramic
Tile
- A137.1-88.....Ceramic Tile
- C. American Society For Testing And Materials (ASTM):
- C109/C109M-07.....Standard Test Method for Compressive Strength of
Hydraulic Cement Mortars (Using 2 inch. or [50-
mm] Cube Specimens)
- C348-02.....Standard Test Method for Flexural Strength of
Hydraulic-Cement Mortars
- C627-93(R2007).....Evaluating Ceramic Floor Tile Installation
Systems Using the Robinson-Type Floor Tester
- C979-05.....Pigments for Integrally Colored Concrete
- C1027-99(R2004).....Determining "Visible Abrasion Resistance on
Glazed Ceramic Tile"
- C1028-07.....Determining the Static Coefficient of Friction
of Ceramic Tile and Other Like Surfaces by the
Horizontal Dynamometer Pull Meter Method
- C1127-01.....Standard Guide for Use of High Solids Content,
Cold Liquid-Applied Elastomeric Waterproofing
Membrane with an Integral Wearing Surface
- D. Marble Institute of America (MIA): Design Manual III-2007
- E. Tile Council of America, Inc. (TCA):
2007.....Handbook for Ceramic Tile Installation

PART 2 - PRODUCTS

2.1 TILE

- A. General: Comply with ANSI A137.1, Standard Grade, except as modified:
1. Inspection procedures listed under the Appendix of ANSI A137.1.
 2. Abrasion Resistance Classification:
 - a. Tested in accordance with values listed in Table 1, ASTM C 1027.
 - b. Class V, 12000 revolutions for floors in Corridors, Kitchens,
Storage including Refrigerated Rooms
 - c. Class IV, 6000 revolutions for remaining areas.
 3. Slip Resistant Tile for Floors:
 - a. Coefficient of friction, when tested in accordance with ASTM
C1028, required for level of performance:
 - 1) Not less than 0.7 (wet condition) for bathing areas.

- 2) Not less than 0.8 on ramps for wet and dry conditions.
- 3) Not less than 0.6, except 0.8 on ramps as stated above, for wet and dry conditions for other areas.
- 4. Mosaic Tile: Mosaic tile may be mounted or joined together by a resinous bonding material along tile edges.
- 5. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
- 6. Factory-Applied Temporary Protective Coating:
 - a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of petroleum paraffin wax, applied hot.
 - b. Do not coat unexposed tile surfaces.
 - c. Pre-wax tiles set or grouted with epoxy or latex modified mortars.
- B. Porcelain Tile:
 - 1. Nominal 8 mm (5/16 inch) or 6 mm (1/4 inch) thick, with cushion edges. Porcelain tile produced by the dust pressed method shall be made of approximately 50% feldspar; the remaining 50% shall be made up of various high-quality light firing ball clays yielding a tile with a water absorption rate of 0.5% or less and a breaking strength of minimum 390 pounds.
 - 2. Acceptable Products:
 - a. Daltile, Keystones Series and Modern Dimensions Series, or equal, as acceptable to Owner and Architect.
- C. Trim Shapes:
 - 1. Conform to applicable requirements of adjoining floor and wall tile.
 - 2. Use trim shapes sizes conforming to size of adjoining field wall tile including existing spaces unless detailed or specified otherwise.
 - 3. Internal and External Corners:
 - a. Square internal and external corner joints are not acceptable.
 - b. External corners including edges: Use bullnose shapes.
 - c. Internal corners: Use cove shapes.
 - d. Base to floor internal corners: Use special shapes providing integral cove vertical and horizontal joint.
 - e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.

- f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
- g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
- h. For unglazed ceramic mosaic and glazed wall tile installed in Portland cement mortar setting bed, use cove and bullnose shapes as applicable. When ceramic mosaic wall and base tile is required, use C Series cove and bullnose shapes.
- i. For unglazed ceramic mosaic and glazed wall tile installed in dry-set Portland cement mortar, latex-Portland cement mortar, and organic adhesive (thin set methods), use cove and surface bullnose shapes as applicable.
- j. Provide cove and bullnose shapes where shown, and required to complete tile work.

2.2 SETTING MATERIALS OR BOND COATS

A. General:

- 1. Conform to TCA Handbook for Ceramic Tile Installation.
- 2. Admixtures: Use of silicone plasticizers and other admixtures is not allowed unless otherwise specified, or acceptable to Architect.

B. Latex-Portland Cement Mortar: ANSI A118.4.

- 1. For wall applications, provide non-sagging, latex-Portland cement mortar complying with ANSI A118.4.
- 2. Prepackaged Dry-Mortar Mix:
 - a. Description: Factory-prepared mixture of Portland cement, latex additive, and other ingredients; dry, redispersible, to which only water needs to be added at Project site.
 - b. Acceptable Products - General:
 - 1) Laticrete International, Inc., 254 Platinum, or equal, as acceptable to Owner and Architect.

C. Organic Adhesives: ANSI A136.1, Type 1.

D. Waterproofing Isolation Membrane:

- 1. Sheet System TCA F122 and ANSI A118.10.
- 2. Composite sheet consisting of ASTM D5109, Type II, Grade I Chlorinated Polyethylene (CM) sheet reinforced on both sides with a non-woven polyester fiber.
- 3. Designed for use in wet areas as an isolation and positive waterproofing membranes for thin-set bonding of sheet to substrate and thin-set bonding of ceramic and porcelain tile or stone to sheet. Suited for both horizontal and vertical applications.

4. Conform to the following additional physical properties:

Property	Units	Results	Test Method
Hardness Shore A	Points	70-80	ASTM D2240 (10 Second Reading)
Shrinkage	Percent	5 maximum	ASTM D1204
Brittleness		No crack remains flexible at temperature-37 degrees C (-25 degrees F)	ASTM D2497 13 mm (1/2- inch) Mandrel Bend
Retention of Properties after Heat Aging	Percent of original	80 Tensile 80 Breaking 80 Elongation	ASTM D3045, 90 degrees C (194 degrees F) for 168 hours

5. Manufacturer's standard sheet size with prefabricated or preformed inside and outside corners.

6. Sheet manufacturer's solvent welding liquid or xylene and edge sealant.

2.3 GROUTING MATERIALS

A. General:

1. Conform to TCA Handbook for Ceramic Tile Installation.

2. Color: As selected by Architect,

B. Latex-Portland Cement Grout: ANSI A118.6. Color as selected by Architect.

1. Unsanded grout mixture for joints 3.2 mm (1/8 inch) and narrower.

2. Sanded grout mixture for joints 3.2 mm (1/8 inch) and wider.

C. Epoxy Grout: Epoxy grout, ANSI A118.3., 100 percent solids, stain resistant and water cleanable. Color as selected by Architect.

2.4 PATCHING AND LEVELING COMPOUND

A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

B. Shall have minimum following physical properties:

1. Compressive Strength: 25 MPa (3500 psig) per ASTM C109/C109M.

2. Flexural Strength: 7 MPa (1000 psig) per ASTM C348 (28 day value).

3. Tensile Strength: 600 psi per ANSI 118.7.

4. Density: 1.9.

C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 100 mm (four inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.

- D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.
- E. Ready for use in 48 hours after application.

2.5 MARBLE THRESHOLD

- A. Soundness Classification in accordance with MIA Design Manual III Groups.
- B. Thresholds:
 1. Group A, Minimum abrasive hardness (Ha) of 10.0 per ASTM C241.
 2. Honed finish on exposed faces.
 3. Thickness and contour as shown.
 4. Fabricate from one piece without holes, cracks, or open seams; full depth of wall or frame opening by full width of wall or frame opening; 19 mm (3/4 inch) minimum thickness and 6 mm (1/4 inch) minimum thickness at beveled edge.
 5. Set not more than 13 mm (1/2-inch) above adjoining finished floor surfaces, with transition edges beveled on a slope of no greater than 1:2. On existing floor slabs provide 13 mm (1/2 inch) above ceramic tile surface with bevel edge joint top flush with adjacent floor.
 6. One piece full width of door opening. Notch thresholds to match profile of door jambs.

2.6 METAL DIVIDER STRIPS

- A. Terrazzo type divider strips, of shape and configuration as indicated on Drawings.
- B. Embedded leg shall be perforated and deformed for keying to mortar.
- C. Aluminum base, anodized, of color as selected by Architect from standard colors of manufacturer.

2.7 WATER

- A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.8 CLEANING COMPOUNDS

- A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
- B. Materials containing acid or caustic material not acceptable.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three days after installation.

- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.
- C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).
- D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).
- E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after fourth day of completion of tile work.

3.2 ALLOWABLE TOLERANCE

- A. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:
 - 1. Not more than 1 in 500 (1/4 inch in 10 feet) from required elevation where Portland cement mortar setting bed is used.
 - 2. Not more than 1 in 1000 (1/8 inch in 10 feet) where dry-set Portland cement, and latex-Portland cement mortar setting beds and chemical-resistant bond coats are used.
- B. Variation in Plane of Wall Surfaces:
 - 1. Not more than 1 in 400 (1/4 inch in eight feet) from required plane where Portland cement mortar setting bed is used.
 - 2. Not more than 1 in 800 (1/8 inch in eight feet) where dry-set or latex-Portland cement mortar or organic adhesive setting materials is used.

3.3 SURFACE PREPARATION

- A. Cleaning New Concrete or Masonry:
 - 1. Chip out loose material, clean off all oil, grease dirt, adhesives, curing compounds, and other deterrents to bonding by mechanical method, or by using products specifically designed for cleaning concrete and masonry.
 - 2. Use self-contained power blast cleaning systems to remove curing compounds and steel trowel finish from concrete slabs where ceramic tile will be installed directly on concrete surface with thin-set materials.
 - 3. Steam cleaning or the use of acids and solvents for cleaning will not be permitted.
- B. Patching and Leveling:
 - 1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
 - 2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.

- a. Thickness of compound as required to bring finish tile system to elevation shown.
 - b. Float finish.
 - c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- 3. Apply patching and leveling compound to concrete and masonry wall surfaces that are out of required plane.
- 4. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
- C. Additional preparation of concrete floors for tile set with epoxy shall be in accordance with the manufacturer's printed instructions.
- D. Walls:
 - 1. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
 - 2. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
- E. Existing Floors and Walls:
 - 1. Remove existing composition floor finishes and adhesive. Prepare surface by grinding, chipping, self-contained power blast cleaning or other suitable mechanical methods to completely expose uncontaminated concrete or masonry surfaces. Follow safety requirements of ANSI A10.20.
 - 2. Remove existing concrete fill or topping to structural slab. Clean and level the substrate for new setting bed and waterproof membrane or cleavage membrane.
 - 3. Where new tile bases are required to finish flush with plaster above or where they are extensions of similar bases in conjunction with existing floor tiles cut channel in floor slab and expose rough wall construction sufficiently to accommodate new tile base and setting material.

3.4 MARBLE THRESHOLD

- A. Secure thresholds in position with minimum of two stainless steel dowels.
- B. Set in latex portland cement mortar.
- C. Set threshold to finish 12mm (1/2 inch) above ceramic tile floor unless shown otherwise, with bevel edge joint top flush with adjacent floor similar to TCA detail TR611-02.

3.5 METAL DIVIDER STRIPS

- A. Install metal divider strips in floor joints between ceramic and porcelain tile floors and between tile floors and adjacent flooring of other materials where the finish floors are flush unless shown otherwise.
- B. Set divider strip in mortar bed to line and level centered under doors or in openings.
- C. At preformed sealant joint: Refer to Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.
 - 1. Comply with recommendations in TCA "Handbook for Ceramic Tile Installation" Vertical and Horizontal Joint Design Essentials. TCA System EJ 171-02.
 - a. Locate joint in tile surfaces directly above joint in sub-floor or where indicated when used with isolation membranes to allow off-setting of joint location from sub-floor joint.
 - b. Fasten full length to sub-floor using a construction adhesive.
 - c. Trowel setting material with full coverage over the entire leg.
 - 2. Set tile up against the joint ensuring that the top edge of the joint is flush or slightly below the top of the tile.

3.6 TILE INSTALLATION

- A. General:
 - 1. Comply with ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" applicable to methods of installation.
 - 2. Comply with TCA Installation Guidelines.
- B. Setting Beds or Bond Coats:
 - 1. Floors: Set floor tile in latex portland cement mortar thin set over waterproofing isolation membrane meeting requirements of ANSI 108.13, TCA System F122. Apply waterproof membrane on substrate with total coverage. Extend membrane 6 inches minimum onto adjacent surfaces required to receive tile, unless otherwise required.
 - 2. Wall Tile:
 - a. Concrete and Masonry: Set wall tile installed over concrete or masonry in latex-Portland cement mortar, ANSI 108.1B.and TCA System W202.
 - b. Gypsum Board - Non-Paver Tile: Set small format, non-paver tile, less than 230 cm² (36 in²), installed over gypsum board in dry areas in organic adhesive, ANSI A108.4, TCA System W242.

- c. Gypsum Board - Paver Tile: Set larger format, paver tiles, 230 cm² (36 in²) and greater, installed over gypsum board in dry areas in latex-Portland cement mortar, ANSI A108.5, TCA System W243-02.
 - d. Gypsum Tile Backer Board - Showers and Wet Areas: Set tile installed over moisture and mold resistant gypsum tile backer board in latex-Portland cement mortar over waterproof membrane, TCA System W244 modified, ANSI A108.5 and ANSI A108.13. Apply waterproof membrane on substrate with total coverage. Extend membrane 6 inches minimum onto adjacent surfaces required to receive tile, unless otherwise required.
3. Trim: Set trim shapes in same material specified for setting adjoining tile.
- C. Grouting:
- 1. Grout Type and Location:
 - a. Grout for Wall Tile - General: Latex-Portland cement grout, sanded or unsanded as required for application.
 - b. Grout for Wall Tile - Showers: Epoxy grout.
 - c. Grout for Floor Tile and Base: Epoxy grout.
 - 2. Workmanship:
 - a. Install and cure grout in accordance with the applicable standard.
 - b. Epoxy Grout: ANSI A108.6.
 - c. Latex Portland Cement Grout: ANSI A108.5.
- D. Workmanship:
- 1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
 - 2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise.
 - 3. Form intersections and returns accurately.
 - 4. Cut and drill tile neatly without marring surface.
 - 5. Cut edges of tile abutting penetrations, finish, or built-in items:
 - a. Fit tile closely around electrical outlets, piping, fixtures and fittings, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.
 - b. Seal tile joints water tight as specified in Section 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.
 - 6. Completed work shall be free from hollow sounding areas and loose, cracked or defective tile.
 - 7. Remove and reset tiles that are out of plane or misaligned.
 - 8. Floors:

- a. Extend floor tile beneath casework and equipment, except those units mounted in wall recesses.
 - b. Align finish surface of new tile work flush with other and existing adjoining floor finish where shown.
 - c. In areas where floor drains occur, slope to drains where shown.
 - d. Shove and vibrate tiles over 200 mm (8 inches) square to achieve full support of bond coat.
9. Walls:
- a. Cover walls and partitions, including pilasters, furred areas, and freestanding columns from floor to ceiling, or from floor to nominal wainscot heights shown with tile.
 - b. Finish reveals of openings with tile, except where other finish materials are shown or specified.
 - c. At window openings, provide tile stools and reveals, except where other finish materials are shown or specified.
 - d. Finish wall surfaces behind and at sides of casework and equipment, except those units mounted in wall recesses, with same tile as scheduled for room proper.
10. Joints:
- a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.
 - b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.
 - c. Make joints in quarry tile work not less than 6 mm (1/4 inch) nor more than 9 mm (3/8 inch) wide. Finish joints flush with surface of tile.
 - d. Make joints in Paver tile, porcelain type; maximum 3 mm (1/8 inch) wide.
11. Back Buttering: For installations indicated below, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
- a. Tile wall installations in wet areas, including showers, tub enclosures, laundries and swimming pools.
 - b. Tile installed with chemical-resistant mortars and grouts.
 - c. Tile wall installations composed of tiles 200 by 200 mm (8 by 8 inches or larger).
 - d. Exterior tile wall installations.

3.7 MOVEMENT JOINTS

- A. Prepare tile expansion, isolation, construction and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.
- B. TCA details EJ 171-02.
- C. At expansion joints, rake out joint full depth of tile and setting bed and mortar bed. Do not cut waterproof or isolation membrane.
- D. Rake out grout at joints between tile, service sink, at toe of base, and where shown not less than 6 mm (1/4 inch) deep.

3.8 CLEANING

- A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.
- B. Methods and materials used shall not damage or impair appearance of tile surfaces.
- C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.
- D. Clean tile grouted with epoxy and tile set in elastomeric bond coat as recommended by the manufacturer of the grout and bond coat.

3.9 PROTECTION

- A. Keep traffic off tile floor, until grout and setting material is firmly set and cured.
- B. Where traffic occurs over tile floor, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

3.10 TESTING FINISH FLOOR

- A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.

3.11 TILE SCHEDULE

- A. Floors:
 - 1. Tile PT-1:
 - a. Type: Porcelain floor tile.
 - b. Size: 50 mm x 50 mm x 6 mm (2" x 2" x 1/4").
 - c. Product: Daltile, Keystones, or equal, as acceptable to Owner and Architect.
 - d. Color: D201 Urban Putty.
 - 2. Marble Divider Strip, DSMB-1:
 - a. Type: One piece marble threshold.
 - b. Size: As required for door opening.
- B. Walls:
 - 1. Tile CT-1:
 - a. Type: Porcelain wall tile.

- b. Size: 4.25" x 8.5" x 5/16".
 - c. Product: Daltile, Modern Dimensions, or equal, as acceptable to Owner and Architect.
 - d. Color: 0761 Matte Urban Putty.
- C. Tile Base CTB-1:
- a. Type: Porcelain wall base.
 - b. Size: 4.25" x 8.5" x 5/16".
 - c. Product: Daltile, Modern Dimensions, or equal, as acceptable to Owner and Architect.
 - d. Color: 0761 Matte Urban Putty.

- - - E N D - - -

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1- GENERAL

1.1 DESCRIPTION

- A. Metal ceiling suspension system for acoustical ceilings.
- B. Acoustical units.
- C. Schedule: Required types and applications of acoustical ceilings include, but are not limited to, materials and application locations specified in Article - Acoustical Ceiling Schedule at the end of this Section.

1.2 RELATED WORK

- A. Seismic restraint requirements: Section 13 05 41, Seismic Restraint Requirements for Non-Structural Components.
- B. Access doors in adhesive applied tile: Section 08 31 13, ACCESS DOORS AND FRAMES.

1.3 SUBMITTAL

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
 - 1. Acoustical units, each type, with label indicating conformance to specification requirements.
 - 2. Colored markers for units providing access.
- C. Manufacturer's Literature and Data:
 - 1. Ceiling suspension system, each type, showing complete details of installation.
 - 2. Acoustical units, each type.
- D. Manufacturer's Certificates: Acoustical units, each type, in accordance with specification requirements.

1.4 DEFINITIONS

- A. Standard definitions as defined in ASTM C634.
- B. Terminology as defined in ASTM E1264.

1.5 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 Society for Testing and Materials (ASTM):
 - A641/A641M-03.....Zinc-coated (Galvanized) Carbon Steel Wire

- A653/A653M-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process
- C423-07.....Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- C634-02 (E2007).....Standard Terminology Relating to Environmental Acoustics
- C635-04.....Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
- C636-06.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
- E84-07.....Surface Burning Characteristics of Building Materials
- E119-07.....Fire Tests of Building Construction and Materials
- E413-04.....Classification for Rating Sound Insulation.
- E580-06.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint
- E1264-(R2005).....Classification for Acoustical Ceiling Products
- C. Ceilings and Interior Systems Construction Association (CISCA):
 - Annual Issue.....Ceiling Systems Handbook
 - Annual Issue.....Acoustical Ceilings: Use and Practice
 - Annual Issue.....Recommendations for Direct-Hung Acoustical Tile and Lay-In Panel Ceilings (Seismic Zones 0-2)
 - Annual Issue.....Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies (Seismic Zones 3 and 4)

PART 2- PRODUCTS

2.1 METAL SUSPENSION SYSTEM

- A. ASTM C635, heavy-duty system, except as otherwise specified.
 - 1. Ceiling suspension system members may be fabricated from either of the following unless specified otherwise.
 - a. Galvanized cold-rolled steel, bonderized.
 - 2. Use same construction for cross runners as main runners. Use of lighter-duty sections for cross runners is not acceptable.

B. Exposed grid suspension system for support of lay-in panels:

1. Exposed grid width not less than 24 mm (15/16 inch) with not less than 8 mm (5/16 inch) panel bearing surface, which accompanies specified panel line..
2. Fabricate wall molding and other special molding from the same material with same exposed width and finish as the exposed grid members.
3. On exposed metal surfaces apply baked-on enamel flat texture finish in color to match adjacent acoustical units.

C. Acceptable Products:

1. Armstrong World Industries, Prelude XL 15/16" Exposed Tee, or equal, as acceptable to Owner and Architect.

2.2 PERIMETER SEAL

- A. Vinyl, polyethylene or polyurethane open cell sponge material having density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.
- B. Thickness as required to fill voids between back of wall molding and finish wall.
- C. Not less than 9 mm (3/8 inch) wide strip.

2.3 WIRE

- A. ASTM A641.
- B. For wire hangers: Minimum diameter 2.68 mm (0.1055 inch).
- C. For bracing wires: Minimum diameter 3.43 mm (0.1350 inch).

2.4 ANCHORS AND INSERTS

- A. General: Anchorage devices applicable to required method of structural anchorage for ceiling hangers and whose suitability for intended application has been proven through construction practices or by certified test data, except as otherwise required.
- B. Anchor Fasteners: Expansion, chemical, cast-in-place and like anchor fasteners, fabricated from steel, zinc coated (galvanized after application), with means for attaching hangers, and capable of sustaining without failure a load equal to 5 times load indicated in ASTM C635, Table 1, Direct Hung, for required structural classification, imposed by actual ceiling hanger, including items supported by ceiling construction, as determined when evaluated meeting requirements of ASTM E488 conducted by an independent testing agency.
- C. Actuated Fasteners: Powder, pneumatic and like power activated fasteners, fabricated from corrosion resistant materials, with means for attaching hangers, and capable of sustaining without failure a load equal to 10 times load indicated in ASTM C635, Table 1, Direct Hung, for

required structural classification, imposed by actual ceiling hanger, including items supported by ceiling construction, as determined when evaluated meeting requirements of ASTM E1190 conducted by an independent testing agency.

D. Clips:

1. Galvanized steel.
2. Designed to clamp to steel beam or bar joists, or secure framing member together.
3. Designed to rigidly secure framing members together.
4. Designed to sustain twice the loads imposed by hangers or items supported.

2.5 CARRYING CHANNELS FOR SECONDARY FRAMING

- A. Fabricate from cold-rolled or hot-rolled steel, black asphaltic paint finish, free of rust.
- B. Weighing not less than the following, per 300 m (per thousand linear feet):

Size mm	Size Inches	Cold-rolled		Hot-rolled	
		Kg	Pound	Kg	Pound
38	1 1/2	215.4	475	508	1120
50	2	267.6	590	571.5	1260

2.6 ACOUSTICAL UNITS

A. General:

1. ASTM E1264, weighing 3.6 kg/m² (3/4 psf) minimum for mineral fiber panels.
2. Class A Flame Spread: ASTM 84.
3. Minimum NRC (Noise Reduction Coefficient): Unless otherwise specified:
 - a. Standard: 0.70.
 - b. Wood Faced: 0.40.
4. Manufacturer standard finish, minimum Light Reflectance (LR) coefficient on the exposed surfaces as follows:
 - a. Standard: 0.90.
 - b. Wood Faced: 0.72.
5. Panel Size and Edge: Panel size and edge condition as indicated in Article - Acoustical Ceiling Schedule, of this Section.

B. Type IV Units - Standard:

1. Description: Wet-formed mineral fiber fine texture unit, Type IV, Form 2. Pattern E with water-based, cleanable painted finish with less than 10 g/L VOC; minimum 19 mm (3/4 inch) thick. Unit shall contain no added urea formaldehyde.

2. Acceptable Products:

a. Armstrong World Industries, Ultima, or equal, as acceptable to Owner and Architect.

C. Composite Units - Wood Veneer:

1. Description: ASTM E1264 Composite Class A; FSC-certified, fire retardant particle board with face-cut veneers; perforated with clear or tinted semigloss coating. Unit shall contain no added urea formaldehyde.

2. Acceptable Products:

a. Armstrong World Industries, Woodworks Tile 5403-W4-NLC Natural Variations Dark Cherry with Round Straight Perforation Pattern RG-6006 (W2), or equal, as acceptable to Owner and Architect.

2.7 ACCESSORIES

A. Acoustic Blanket/Pad: Acoustic blanket or pad standard of manufacturer, Class A for exposed applications with 25 maximum flame spread and 50 maximum smoke developed when evaluated meeting requirements of ASTM E84, plenum rated and black in color, for enhanced acoustical performance with limited visibility.

2.8 ACCESS IDENTIFICATION

A. Markers:

1. Use colored markers with pressure sensitive adhesive on one side.
2. Make colored markers of paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) in diameter.

B. Use markers of the same diameter throughout building.

C. Color Code: Use following color markers for service identification:

Color.....Service

Red.....Sprinkler System: Valves and Controls

Green.....Domestic Water: Valves and Controls

Yellow.....Chilled Water and Heating Water

Orange.....Ductwork: Fire Dampers

Blue.....Ductwork: Dampers and Controls

Black.....Gas: Laboratory, Medical, Air and Vacuum

PART 3 - EXECUTION**3.1 CEILING TREATMENT**

- A. Treatment of ceilings shall include sides and soffits of ceiling beams, furred work 600 mm (24 inches) wide and over, and vertical surfaces at changes in ceiling heights unless otherwise shown. Install acoustic tiles after wet finishes have been installed and solvents have cured.
- B. Lay out acoustical units symmetrically about center lines of each room or space unless shown otherwise on reflected ceiling plan.
- C. Moldings:
 - 1. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.
 - 2. Install special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.
- D. Perimeter Seal:
 - 1. Install perimeter seal between vertical leg of wall molding and finish wall, partition, and other vertical surfaces.
 - 2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding.

3.2 CEILING SUSPENSION SYSTEM INSTALLATION

- A. General:
 - 1. Install metal suspension system for acoustical tile and lay-in panels in accordance with ASTM C636, except as specified otherwise.
 - 2. Use direct or indirect hung suspension system or combination thereof as defined in ASTM C635.
 - 3. Support a maximum area of 1.48 m² (16 sf) of ceiling per hanger.
 - 4. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
 - 5. Provide extra hangers, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.
 - 6. Provide not less than 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown,
 - 7. Use main runners not less than 1200 mm (48 inches) in length.
 - 8. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.

B. Anchorage to Structure:

1. Concrete: Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger and bracing wire. Install in sides of concrete beams or joists at mid height.

C. Direct Hung Suspension System:

1. As illustrated in ASTM C635.
2. Support main runners by hanger wires attached directly to the structure overhead.
3. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.

D. Indirect Hung Suspension System:

1. As illustrated in ASTM C635.
2. Space carrying channels for indirect hung suspension system not more than 1200 mm (4 feet) on center. Space hangers for carrying channels not more than 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) on center so as to insure that specified requirements are not exceeded.
3. Support main runners by specially designed clips attached to carrying channels.

E. Seismic Ceiling Bracing System:

1. Construct system in accordance with ASTM E580.
2. Connect bracing wires to structure above as specified for anchorage to structure and to main runner or carrying channels of suspended ceiling at bottom.

3.3 ACOUSTICAL UNIT INSTALLATION

A. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.

B. Install lay-in acoustic panels in exposed grid with not less than 6 mm (1/4 inch) bearing at edges on supports.

1. Install tile to lay level and in full contact with exposed grid.
2. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.

C. Markers:

1. Install markers of color code specified to identify the various concealed piping, mechanical, and plumbing systems.
2. Attach colored markers to exposed grid on opposite sides of the units providing access.

3. Attach marker on exposed ceiling surface of upward access acoustical unit.

3.4 CLEAN-UP AND COMPLETION

- A. Replace damaged, discolored, dirty, cracked and broken acoustical units.
- B. Leave finished work free from defects.

3.5 ACOUSTICAL CEILING SCHEDULE

A. Acoustical Ceiling AT-1:

1. Size: 600 mm x 600 mm (24" x 24").
2. Grid: 24 mm (15/16 inch) wide flanges.
3. Panel: Type IV - Standard, Armstrong World Industries, Ultima 1910, or equal, as acceptable to Owner and Architect.
4. Edge: Square lay-in edges.
5. Color: White.

B. Acoustical Ceiling AT-2:

1. Size: 600 mm x 600 mm (24" x 24").
2. Grid: 24 mm (15/16 inch) wide flanges.
3. Panel: Composite Unit - Wood Veneer, Armstrong World Industries, Woodworks Vector 5403-W4-NLC, or equal, as acceptable to Owner and Architect.
4. Edge: Vector lay-in edges, 1/4 inch reveal style.
5. Color and Pattern: Natural Variations Light Cherry, Round Straight-RG 6006 (W2).
6. Accessories: Provide black acoustical blanket/pad.

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SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the installation of resilient base, and resilient edge strips.
- B. Schedule: Required types and applications of resilient base include, but are not limited to, materials and application locations specified in Article - Resilient Accessory Schedule at the end of this Section.

1.2 RELATED WORK

- A. Section 09 65 19, RESILIENT TILE FLOORING.
- B. Section 09 68 00, CARPETING.

1.3 QUALITY CONTROL-QUALIFICATIONS:

- A. The Contracting Officer shall approve products or service of proposed manufacturer, suppliers, and installers, and the Contractor shall submit certification that:
 - 1. Installer is approved by manufacturer of materials and has technical qualifications, experience, trained personnel, and facilities to install specified items.
 - 2. Manufacturer's product submitted has been in satisfactory operation, on three installations similar and equivalent in size to this project for three years. Submit list of installations.
- B. The resilient base and accessories shall meet fire performance characteristics as determined by testing products, per ASTM test method, indicated below by Underwriters Laboratories, Inc. (UL) or another recognized testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.
 - 2. Smoke Density: Less than 450 per ASTM E662.
- C. The manufacturer shall certify that products supplied for installation comply with local regulations controlling use of volatile organic compounds (VOC's).

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. Description of each product.
2. Base material manufacturer's recommendations for adhesives.
3. Application and installation instructions.

C. Samples:

1. Base: 150 mm (6 inches) long, each type and color.
3. Adhesive: Literature indicating each type.

1.5 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.

1.6 STORAGE

- A. Store materials in weather tight and dry storage facility.
- B. Protect material from damage by handling and construction operations before, during, and after installation.

1.7 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):
F1344-04.....Rubber Floor Tile
F1861-02.....Resilient Wall Base

PART 2 - PRODUCTS

2.1 GENERAL

- A. Use only products by the same manufacturer and from the same production run.

2.2 RESILIENT BASE

- A. General: Use only one type of base throughout, unless otherwise indicated by Contract Documents.
- B. Rubber Base: ASTM F1861, Type TP, Group 1, solid homogenous rubber, color and pattern throughout thickness of base.
 1. Height: 81 MM (3-1/4 inches).
 2. Thickness: 6 mm (1/4 inch) thick, wedge shape with hidden spacer to accept floor material.
 3. Style:
 - a. Carpet: Straight base.
 - b. Resilient Flooring: Coved base.

4. Corners: Project site formed corners and ends matching base.
5. Surface: Smooth.
6. Finish: Matte sheen.
7. Acceptable Products:
 - a. Johnsonite, Inc., TightLock Carpet and Resilient Wall Base, or equal, as acceptable to Owner and Architect.

2.3 RESILIENT EDGE STRIPS

- A. Description: Solid homogenous rubber.
 1. Edge Profile: Tapered or bullnosed.
 2. Size: One inch minimum width and same thickness as adjacent resilient flooring.
 3. Color: Match adjacent resilient flooring or as selected by Architect from standard color range of manufacturer.
 4. Application: Provide at edges of resilient flooring where edge is exposed, except as otherwise indicated by Contract Documents.
 5. Acceptable Manufacturer: Johnsonite, Inc., or equal, as acceptable to Owner and Architect.

2.4 PRIMER (FOR CONCRETE FLOORS)

- A. As recommended by the adhesive and tile manufacturer.

2.5 LEVELING COMPOUND (FOR CONCRETE FLOORS)

- A. Provide products with latex or polyvinyl acetate resins in the mix.

2.6 ADHESIVES

- A. Use products recommended by the material manufacturer for the conditions of use.
- B. Use low-VOC water based adhesive during installation.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Maintain temperature of materials above 21° C (70 °F), for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs, between 21° C and 27° C (70°F and 80°F) for at least 48 hours, before, during, and after installation.
- C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

3.2 INSTALLATION REQUIREMENTS

- A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the Contracting Officer's Technical Representative.
- B. Submit proposed installation deviation from this specification to the Contracting Officer's Technical Representative indicating the differences in the method of installation.
- C. The Contracting Officer's Technical Representative reserves the right to have test portions of material installation removed to check for non-uniform adhesion and spotty adhesive coverage.

3.3 PREPARATION

- A. Examine surfaces on which material is to be installed.
- B. Fill cracks, pits, and dents with leveling compound.
- C. Level to 3 mm (1/8 inch) maximum variations.
- D. Do not use adhesive for leveling or filling.
- E. Grind, sand, or cut away protrusions; grind high spots.
- F. Clean substrate area of oil, grease, dust, paint, and deleterious substances.
- G. Substrate area dry and cured. Perform manufacturer's recommended bond and moisture test.
- H. Preparation of existing installation:
 - 1. Remove existing base and stair treads including adhesive.
 - 2. Do not use solvents to remove adhesives.
 - 3. Prepare substrate as specified.

3.4 BASE INSTALLATION

- A. Location:
 - 1. Unless otherwise specified or shown, where base is scheduled.
 - 2. Extend base scheduled for room into adjacent closet, alcoves, and around columns.
- B. Application:
 - 1. Apply adhesive uniformly with no bare spots.
 - 2. Set base with joints aligned and butted to touch for entire height.
 - 3. Before starting installation, layout base material to provide the minimum number of joints with no strip less than 600 mm (24 inches) length.
 - a. Short pieces to save material will not be permitted.
 - b. Locate joints as remote from corners as the material lengths or the wall configuration will permit.
- C. Form corners and end stops as follows:
 - 1. Score back of outside corner.

2. Score face of inside corner and notch cove.

C. Roll base for complete adhesion.

3.5 RESILIENT EDGE STRIPS

A. Place resilient edge strips tightly butted to resilient flooring and secure with adhesive. Install edging strips at all exposed or unprotected edges of flooring.

B. Locate strips under center lines of doors unless otherwise indicated by Contract Documents.

3.6 CLEANING AND PROTECTION

A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.

B. Keep traffic off resilient material for at least 72 hours after installation.

C. Clean materials in the following order:

1. After two weeks, scrub resilient base, sheet rubber and treads materials with a minimum amount of water and a mild detergent. Leave surfaces clean and free of detergent residue.

2. Do not polish sheet rubber materials.

D. When construction traffic is anticipated, cover tread materials with reinforced kraft paper and plywood or hardboard properly secured and maintained until removal is directed by the Contracting Officer's Technical Representative.

E. Where protective materials are removed and immediately prior to acceptance, replace damaged materials and re-clean resilient materials. Damaged materials are defined as having cuts, gouges, scrapes or tears and not fully adhered.

3.7 RESILIENT ACCESSORY SCHEDULE

A. Resilient Base, RB-1:

1. Type: Rubber base.

2. Style: Johnsonite, TightLock Carpet and Resilient Wall Base, or equal, as acceptable to Owner and Architect.

3. Height: 100 mm (4 inches).

4. Color: 01 Snow White.

B. Resilient Base, RB-2:

1. Type: Rubber base.

2. Style: Johnsonite, TightLock Carpet and Resilient Wall Base, or equal, as acceptable to Owner and Architect.

3. Height: 100 mm (4 inches).

4. Color: 280 Shoreline.

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SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the installation of rubber tile flooring.

1.2 RELATED WORK

A. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

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. Description of each product.
2. Resilient material manufacturers recommendations for adhesives, underlayment, primers and polish.
3. Application and installation instructions.

C. Samples:

1. Tile: 300 mm by 300 mm (12 inches by 12 inches) for each type, pattern and color.
2. Edge Strips: 150 mm (6 inches) long, each type.
3. Feature Strips: 150 mm (6 inches) long.

D. Shop Drawings:

1. Layout of patterns shown on the Drawings.
2. Edge strip locations showing types and detail cross sections.

E. Test Reports:

1. Abrasion resistance: Depth of wear for each tile type and color and volume loss of tile, certified by independent laboratory.
2. Tested per ASTM F510.

1.4 DELIVERY

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Materials from containers which have been distorted, damaged or opened prior to installation will be rejected.

1.5 STORAGE

A. Store materials in weathertight and dry storage facility.

B. Protect from damage from handling, water, and temperature.

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):
 - E648-08.....Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
 - E662-06.....Specific Optical Density of Smoke Generated by Solid Materials
 - E1155-96 (R2008).....Determining Floor Flatness and Floor Levelness Numbers
 - F510-93 (R 2004).....Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method
 - F710-08.....Preparing Concrete Floors to Receive Resilient Flooring
 - F1344-04.....Rubber Floor Tile
- C. Resilient Floor Covering Institute (RFCI):
 - IP #2.....Installation Practice for Vinyl Composition Tile (VCT)
- D. Federal Specifications (Fed. Spec.):
 - SS-T-312.....Tile Floor: Asphalt, Rubber, Vinyl and Vinyl Composition

PART 2 - PRODUCTS

2.1 GENERAL

- A. Furnish product type, materials of the same production run and meeting following criteria.
- B. Use adhesives, underlayment, primers and polish recommended by the floor resilient material manufacturer.
- C. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E 648.
- D. Smoke density: Less than 450 per ASTM E662.

2.2 RUBBER TILE

- A. ASTM F1344, Class 1, homogenous rubber tile, B, through mottled, 300 mm (12 inches) square, 3 mm (1/8 inch) thick.
- B. Color and pattern uniformly distributed throughout tile.
- C. Molded pattern wearing surface base thickness 3 mm (1/8 inch) thick.

- D. Where rubber tile is used provide tiles with a minimum of 90% post consumer rubber.
- E. Acceptable Products:
 - 1. Nora Systems, Norament 935 Grano, or equal, as acceptable to Owner and Architect.

2.3 ADHESIVES

- A. Comply with applicable regulations regarding toxic and hazardous materials Green Seal (GS-36) for commercial adhesive.
- B. Use low-VOC adhesive during installation. Water based is preferred over solvent based adhesives.

2.4 PRIMER (FOR CONCRETE SUBFLOORS)

- A. Low-VOC as recommended by the adhesive and tile manufacturer.

2.5 LEVELING COMPOUND (FOR CONCRETE FLOORS)

- A. Provide cementitious products with latex or polyvinyl acetate resins in the mix.
- B. Determine the type of underlayment selected for use by the condition to be corrected.

2.6 CLEANERS

- A. Cleaners RFCI CL-1.

2.7 EDGE STRIPS

- A. 27 mm (1 inch) wide unless shown otherwise.
- B. Bevel from maximum thickness to minimum thickness for flush joint unless shown otherwise.
- C. Resilient Edge Strip or Reducer Strip: Fed. Specs. SS-T-312, solid rubber.

2.8 FEATURE STRIPS

- A. Use same material as floor tile.
- B. Sizes and shapes as shown.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Maintain temperature of materials a minimum of 22 °C (70 °F,) for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs between 21 °C and 27 °C (70 °F and 80 °F), for at least 48 hours, before, during and after installation.
- C. Do not install flooring until building is permanently enclosed and wet construction in or near areas to receive tile materials is complete, dry and cured.

3.2 SUBFLOOR PREPARATION

- A. Verify that concrete slabs comply with ASTM F710. At existing slabs, determine levelness by F-number method in accordance with ASTM E1155. Overall value shall not exceed as follows:
FF30/FL20
- B. Correct conditions which will impair proper installation.
- C. Fill cracks, joints and other irregularities in concrete with leveling compound:
 - 1. Do not use adhesive for filling or leveling purposes.
 - 2. Do not use leveling compound to correct imperfections which can be corrected by spot grinding.
 - 3. Trowel to smooth surface free of trowel marks, pits, dents, protrusions, cracks or joints.
- D. Clean floor of oil, paint, dust, and deleterious substances: Leave floor dry and cured free of residue from existing curing or cleaning agents.
- E. Concrete Subfloor Testing: Determine Adhesion and dryness of the floor by bond and moisture tests as recommended by RFCI manual MRP.
- F. Perform additional subfloor preparation to obtain satisfactory adherence of flooring if subfloor test patches allows easy removal of tile.
- G. Prime the concrete subfloor if the primer will seal slab conditions that would inhibit bonding, or if priming is recommended by the tile or adhesive manufacturers.
- H. Preparation of existing installation shall include the removal of existing resilient floor and existing adhesive. Do not use solvents to remove adhesives.

3.3 INSTALLATION - GENERAL

- 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 will not be accepted.
- C. Tile Layout:
 - 1. If layout is not shown on drawings, lay tile symmetrically about center of room or space with joints aligned.
 - 2. No tile shall be less than 150 mm (6 inches) and of equal width at walls.
 - 3. Place tile pattern in the same direction; do not alternate tiles.
- D. Trim tiles to touch for the length of intersections at pipes and vertical projections, seal joints at pipes with waterproof cement.

E. Application:

1. Apply adhesive uniformly with no bare spots.
 - a. Conform to RFC1-TM-6 for joint tightness and for corner intersection unless layout pattern shows random corner intersection.
 - b. More than 5 percent of the joints not touching will not be accepted.
2. Roll tile floor with a minimum 45 kg (100 pound) roller. No exceptions.
3. The Contracting Officer's Technical Representative may have test tiles removed to check for non-uniform adhesion, spotty adhesive coverage, and ease of removal. Install new tile for broken removed tile.

F. Installation of Edge Strips:

1. Locate edge strips under center line of doors unless otherwise shown.
2. Set resilient edge strips in adhesive.
3. Where tile edge is exposed, butt edge strip to touch along tile edge.
4. Where thin set ceramic tile abuts resilient tile, set edge strip against floor file and against the ceramic tile edge.

3.4 CLEANING AND PROTECTION

- A. Clean and prepare flooring surfaces meeting instructions and recommendations of manufacturer.
- B. Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.
- C. Keep traffic off resilient material for a minimum 72 hours after installation.
- D. Clean materials in the following order:
 1. For the first two weeks sweep and damp mopped only.
 2. After two weeks, scrub resilient materials with a minimum amount of water and a mild detergent. Leave surface clean and free of detergent residue.
- E. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by Contracting Officer's Technical Representative. 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 Contracting Officer's Technical Representative.

F. When protective materials are removed and immediately prior to acceptance, replace any damage tile, re-clean resilient materials, lightly buff floors.

3.5 LOCATION

A. Extend tile flooring for room into adjacent closets and alcoves.

3.6 RESILIENT TILE FLOORING SCHEDULE

A. Resilient Tile Flooring, RF-1:

1. Type: Rubber tile flooring.
2. Style: Nora Systems, Norament 935 Grano, or equal, as acceptable to Owner and Architect.
3. Size: 39.5" x 39.5"
4. Finish: Hammered.
5. Color: 4899 Black Pearl.

B. Resilient Tile Flooring, RF-2:

1. Type: Rubber tile flooring.
2. Style: Nora Systems, Norament 925 Grano, or equal, as acceptable to Owner and Architect..
3. Size: 39.5" x 39.5"
4. Finish: Hammered.
5. Color: 4877 Tanzanite

C. Resilient Tile Flooring, RF-3:

1. Type: Rubber tile flooring.
2. Style: Nora Systems, Norament 935 Grano, or equal, as acceptable to Owner and Architect..
3. Size: 39.5" x 39.5"
4. Finish: Hammered.
5. Color: 4895 Tigers Eye.

REV1

D. Resilient Tile Flooring, RF-4:

1. Type: Electrostatic Dissipative Rubber Floor tile
2. Style: Nora Systems, Norament 4881 Grano, or equal, as acceptable to Owner and Architect..
3. Size: 39.5" x 39.5"
4. Finish: Hammered.
5. Color: Hemotite.

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SECTION 09 68 00
CARPETING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section specifies carpet, edge strips, adhesives, preparation of substrates to receive carpet and other items required for complete installation.
- B. Schedule: Required types and applications of carpet include, but are not limited to, materials and application locations specified in Article - Carpet Schedule at the end of this Section.

1.2 RELATED WORK

- A. Resilient Wall Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

1.3 QUALITY ASSURANCE

- A. Carpet installed by mechanics certified by the Floor Covering Installation Board.
- B. Certify and label the carpet that it has been tested and meets criteria of CRI IAQ Carpet Testing Program for indoor air quality.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data:
 - 1. Manufacturer's catalog data and printed documentation stating physical characteristics, durability, resistance to fading and flame resistance characteristics for each type of carpet material and installation accessory.
 - 2. Manufacturer's printed installation instructions for the carpet, including preparation of installation substrate, seaming techniques and recommended adhesives and tapes.
 - 3. Manufacturer's certificate verifying carpet containing recycled materials include percentage of recycled materials as specified.
- C. Samples:
 - 1. Carpet: "Production Quality" samples 300 x 300 mm (12 x 12 inches) of carpets, showing quality, pattern and color specified.
 - 2. Floor Edge Strip (Molding): 150 mm (6 inches) long of each color and type specified.
 - 3. Base Edge Strip (Molding): 150 mm (6 inches) long of each color specified.

- D. Shop Drawings: Installers layout plan showing seams and cuts for sheet carpet and carpet module.
- E. Maintenance Data: Carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods and cleaning cycles.

1.5 DELIVERY AND STORAGE

- A. Deliver carpet in manufacturer's original wrappings and packages clearly labeled with manufacturer's name, brand, name, size, dye lot number and related information.
- B. Deliver adhesives in containers clearly labeled with manufacturer's name, brand name, number, installation instructions, safety instructions and flash points.
- C. Store in a clean, dry, well ventilated area, protected from damage and soiling. Maintain storage space at a temperature above 16 degrees C (60 degrees F) for 2 days prior to installation.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Areas in which carpeting is to be installed shall be maintained at a temperature above 16 degrees C (60 degrees F) for 2 days before installation, during installation and for 2 days after installation. A minimum temperature of 13 degrees C (55 degrees F) shall be maintained thereafter for the duration of the contract. Traffic or movement of furniture or equipment in carpeted area shall not be permitted for 24 hours after installation. Other work which would damage the carpet shall be completed prior to installation of carpet.

1.7 WARRANTY

- A. Carpet and installation subject to terms of "Warranty of Construction" FAR clause 52.246-21, except that warranty period is extended to two years.

1.8 APPLICABLE PUBLICATIONS

- A. Publication listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American National Standards Institute (ANSI):
 - ANSI/NSF 140-07.....Sustainable Carpet Assessment Standard
 - ANSI A117.1.....Accessible and Useable Buildings and Facilities
- C. American Association of Textile Chemists and Colorists (AATCC):
 - AATCC 16-04.....Colorfastness to Light
 - AATCC 129-05.....Colorfastness to Ozone in the Atmosphere under High Humidities

AATCC 134-06.....Electric Static Propensity of Carpets

AATCC 165-99.....Colorfastness to Crocking: Textile Floor

Conerings-AATCC Crockmeter Method

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

ASTM D1335-05.....Tuft Bind of Pile Yarn Floor Coverings

ASTM D3278-96 (R2004)...Flash Point of Liquids by Small Scale Closed-Cup Apparatus

ASTM D5116-06.....Determinations of Organic Emissions from Indoor
Materials/Products

ASTM D5252-05.....Operation of the Hexapod Tumble Drum Tester

ASTM D5417-05.....Operation of the Vettermann Drum Tester

ASTM E648-06.....Critical Radiant Flux of Floor-Covering Systems
Using a Radiant Heat Energy Source

E. The Carpet and Rug Institute (CRI):

CRI 104-02.....Installation of Commercial Carpet

F. United States Department of Justice (USDOJ):

ADA.....Americans with Disabilities Act

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Physical Characteristics:

1. Carpet free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains and other physical and manufacturing defects.
2. Manufacturers standard construction commercial carpet:
 - a. Modular Tile: 60 cm (24 inches) square tile.
3. Provide static control to permanently control static build up to less than 1.8 kV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
4. Pile Height: Maximum 4.7 mm (0.18 inch).
5. Pile Fiber: Braided nylon.
6. Pile Type: All loop.
7. Backing materials: Manufacturer's unitary backing designed for glue-down installation using recovered materials.
8. Appearance Retention Rating (ARR): Carpet shall be tested and have the minimum 3.5-4.0 Severe ARR when tested in accordance with either the ASTM D 5252 (Hexapod) or ASTM D 5417 (Vettermann) test methods using the number of cycles for short and long term tests as specified.

9. Tuft Bind: Minimum force of 40 N (10 lb) required to pull a tuft or loop free from carpet backing. Test per ASTM D1335.
10. Colorfastness to Crocking: Dry and wet crocking and water bleed, comply with AATCC 165 Color Transference Chart for colors, minimum class 4 rating.
11. Colorfastness to Ozone: Comply with AATCC 129, minimum rating of 4 on the AATCC color transfer chart.
12. Delamination Strength: Minimum of 440 N/m (2.5 lb/inch) between secondary backing.
13. Flammability and Critical Radiant Flux Requirements:
 - a. Flammability: Passing Methenamine Pill Test when evaluated meeting requirements of ASTM D2859 or USDOC FF-1 Pill Test and passing CPSC 16CFR1630.
 - b.
 - c. Critical Radiant Flux: Class I, 0.45 watts per square centimeter minimum.
 - d.
14. Density: Average Pile Yarn Density (APYD):
 - a. Corridors, lobbies, entrances, common areas or multipurpose rooms, open offices, waiting areas and dining areas: Minimum APYD 6000.
 - b. Other areas: Minimum APYD 4000.
15. VOC Limits: Use carpet and carpet adhesive that comply with the following limits for VOC content when tested according to ASTM D 5116:
 - a. Carpet, Total VOCs: 0.5 mg/sq.m x hr.
 - b. Carpet, 4-PC (4-Phenylcyclohexene): 0.05 mg/sq.m x hr.
 - c. Carpet, Formaldehyde: 0.05 mg/sq.m x hr.
 - d. Carpet, Styrene: 0.4 mg/sq.m x hr.
 - e. Adhesive, Total VOCs: 10.00 mg/sq.m x hr, 50 g/L maximum VOC content.
 - f. Adhesive, Formaldehyde: 0.05 mg/sq.m x hr.
 - g. Adhesive, 2-Ethyl-1-Hexanol: 3.00 mg/sq.m x hr.
- B. Shall meet platinum level of ANSI/NSF 140.
- C. Color, Texture, and Pattern: As indicated in carpet schedule at end of this Section.

D. Acceptable Product:

1. Tandus, US, Box Study 03295, or equal, as acceptable to Owner and Architect.

2.2 ADHESIVE AND CONCRETE PRIMER

- A. Waterproof, resistant to cleaning solutions, steam and water, nonflammable, complies with air-quality standards as specified and as recommended by carpet manufacturer. Adhesives flashpoint minimum 60 degrees C (140 degrees F), complies with ASTM D 3278.

2.3 EDGE STRIPS (MOLDING)

- A. Resilient Edge Strip:
1. Beveled floor flange minimum 50 mm (2 inches) wide.
 2. Beveled surface to finish flush with carpet for tight joint and other side to floor finish.

2.4 LEVELING COMPOUND (FOR CONCRETE FLOORS)

- A. Provide Portland cement bases polymer modifier with latex or polyvinyl acetate resin manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
- B. Determine the type of underlayment selected for use by condition to be corrected.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Examine surfaces on which carpeting is to be installed.
- B. Clean floor of oil, waxy films, paint, dust and deleterious substances that prevent adhesion, leave floor dry and cured, free of residue from curing or cleaning agents and existing carpet materials.
- C. Correct conditions which will impair proper installation, including trowel marks, pits, dents, protrusions, cracks or joints.
- D. Fill cracks, joints depressions, and other irregularities in concrete with leveling compound.
1. Do not use adhesive for filling or leveling purposes.
 2. Do not use leveling compound to correct imperfections which can be corrected by spot grinding.
 3. Trowel to smooth surface free of trowel marks, pits, dents, protrusions, cracks or joint lines.
- E. Test new concrete subfloor prior to adhesive application for moisture and surface alkalinity per CRI 104 Section 6.3.1 or per ASTM E1907.

3.2 CARPET INSTALLATION

- A. Do not install carpet until work of other trades including painting is complete and dry.
- B. Install in accordance with CRI 104 direct glue down installation.
 - 1. Relax carpet in accordance with Section 6.4.
 - 2. Comply with indoor air quality recommendations noted in Section 6.5.
 - 3. Maintain temperature in accordance with Section 15.3.
- C. Secure carpet to subfloor of spaces with adhesive applied as recommended by carpet manufacturer.
- D. Follow carpet manufacturer's recommendations for matching pattern and texture directions.
- E. Cut openings in carpet where required for installing equipment, pipes, outlets, and penetrations.
 - 1. Bind or seal cut edge of sheet carpet and replace flanges or plates.
 - 2. Use additional adhesive to secure carpets around pipes and other vertical projections.
- F. Carpet Modules:
 - 1. Install per CRI 104, Section 13, Adhesive Application.
 - 2. Lay carpet modules with pile in same direction unless specified otherwise by Contract Documents.
 - 3. Install carpet modules so that cleaning methods and solutions do not cause dislocation of modules.
 - 4. Lay carpet modules uniformly to provide tight flush joints free from movement when subject to traffic.

3.3 EDGE STRIPS INSTALLATION

- A. Install edge strips over exposed carpet edges adjacent to uncarpeted finish flooring.
- B. Anchor resilient edge strip to floor with adhesive apply adhesive to edge strip and insert carpet into lip and press lip down over carpet.

3.4 PROTECTION AND CLEANING

- A. Remove waste, fasteners and other cuttings from carpet floors.
- B. Vacuum carpet and provide suitable protection. Do not use polyethylene film.
- C. Do not permit traffic on carpeted surfaces for at least 48 hours after installation. Protect the carpet in accordance with CRI 104.
- D. Do not move furniture or equipment on unprotected carpeted surfaces.
- E. Just before final acceptance of work, remove protection and vacuum carpet clean.

3.5 CARPET SCHEDULE

A. Carpet CPT-1:

1. Type: Modular tile.
2. Style: Tandus, US, BOX STUDY 03295, or equal, as acceptable to Owner and Architect.
3. Size: 60 cm X 60 cm (24 in X 24 in).
4. Color: 36011 BAILIWICK.

- - - E N D - - -

SECTION 09 91 00
PAINTING

PART 1-GENERAL

1.1 DESCRIPTION

- A. Section specifies field painting.
- B. Section specifies prime coats which may be applied in shop under other sections.
- C. Painting includes striping or markers and identity markings.

1.2 RELATED WORK

- A. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS, Division 21 - FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 - HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 - ELECTRONIC SAFETY AND SECURITY sections.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
Before work is started, or sample panels are prepared, submit manufacturer's literature, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.
- C. 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 by 250 by 3 mm (4 inch by 10 inch by 1/8 inch).

3. Panel to show transparent finishes: Wood of same species and grain pattern as wood approved for use, 100 by 250 by 3 mm (4 inch by 10 inch face by 1/4 inch) thick minimum, and where both flat and edge grain will be exposed, 250 mm (10 inches) long by sufficient size, 50 by 50 mm (2 by 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 paint system designation as specified in this Section.
 - c. Product type and color.
 - d. Name of project.
5. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.
- D. Sample of identity markers if used.
- E. Manufacturers' Certificates indicating compliance with specified requirements:
 1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.

1.4 DELIVERY AND STORAGE

- A. Deliver materials to site in manufacturer's sealed container marked to show following:
 1. Name of manufacturer.
 2. Product type.
 3. Batch number.
 4. Instructions for use.
 5. Safety precautions.
- B. In addition to manufacturer's label, provide a label legibly printed as following:
 1. Federal Specification Number, where applicable, and name of material.
 2. Surface upon which material is to be applied.
 3. If paint or other coating, state coat types; prime, body or finish.
- C. Maintain space for storage, and handling of painting materials and equipment in a neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.
- D. Store materials at site at least 24 hours before using, at a temperature between 18 and 30 degrees C (65 and 85 degrees F).

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

- B. American Conference of Governmental Industrial Hygienists (ACGIH):
ACGIH TLV-BKLT-2008.....Threshold Limit Values (TLV) for Chemical
Substances and Physical Agents and Biological
Exposure Indices (BEIs)
ACGIH TLV-DOC-2008.....Documentation of Threshold Limit Values and
Biological Exposure Indices, (Seventh Edition)
- C. American National Standards Institute (ANSI):
A13.1-07.....Scheme for the Identification of Piping Systems
- D. Federal Specifications (Fed Spec):
TT-P-1411A.....Paint, Copolymer-Resin, Cementitious (For
Waterproofing Concrete and Masonry Walls) (CEP)
- E. Master Painters Institute (MPI):
No. 4.....Block Filler, Latex, Interior/Exterior
No. 18.....Organic Zinc Rich Coating
No. 36.....Knot Sealer
No. 54 X-Green.....Latex, Interior, Semi-Gloss (MPI Gloss Level 5
No. 91.....Wood Filler Paste
No. 137.....Primer, Stain Blocking, Water Based
No. 143 X-Green.....Latex, Interior, Institutional Low Odor/VOC, Flat
(MPI Gloss Level 1)
No. 145 X-Green.....Latex, Interior, Institutional Low Odor/VOC,
Eggshell (MPI Gloss Level 3)
No. 149 X-Green.....Primer Sealer, Interior Institutional Low Odor/VOC
No. 153.....Light Industrial Coating, Water Based, Interior,
Semi-Gloss (MPI Gloss Level 5)
No. 154.....Light Industrial Coating, Water Based, Interior,
Gloss (MPI Gloss Level 6)
No. 163.....Light Industrial Coating, Water Based, Exterior,
Semi-Gloss (MPI Gloss Level 5)
No. 164.....Light Industrial Coating, Water Based, Exterior,
Gloss (MPI Gloss Level 6)
No. 169.....Primer, Latex for Exterior Wood
No. 215.....Epoxy-Modified Latex Interior, Semi-Gloss (MPI
Gloss Level 5)
- F. Steel Structures Painting Council (SSPC):
SSPC SP 1-04 (R2004)....Solvent Cleaning
SSPC SP 2-04 (R2004)....Hand Tool Cleaning
SSPC SP 3-04 (R2004)....Power Tool Cleaning

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Identity markers options:
 - 1. Pressure sensitive vinyl markers.
 - 2. Snap-on coil plastic markers.
- B. Latex Block Filler: MPI 4.
- C. Organic Zinc Rich Coating: MPI 18.
- D. Knot Sealer: MPI 36.
- E. Latex, Interior, Semi-Gloss (SG): MPI 54 X-Green.
- F. Wood Filler Paste: MPI 91.
- G. Interior Stain Blocking Primer: MPI 137.
- H. Interior Latex, Institutional, Low Odor/VOC, Flat (LF): MPI 143 X-Green.
- I. Interior Latex, Institutional, Low Odor/VOC, Eggshell (LE): MPI 145 X-Green.
- J. Interior Primer Sealer, Institutional Low Odor/VOC: MPI 149 X-Green
- K. Interior Light Industrial Acrylic Coating, Water Based, Semi-Gloss (IS-1): MPI 153
- L. Interior Light Industrial Acrylic Coating, Water Based, Gloss (IG-1): MPI 154
- M. Exterior Light Industrial Acrylic Coating, Water Based, Semi-Gloss (IS-2): MPI 163
- N. Exterior Light Industrial Acrylic Coating, Water Based, Gloss (IG-2): MPI 164
- O. Exterior Wood Primer: MPI 169
- P. Interior Epoxy-Modified Acrylic: MPI 215 (AE).
- Q. Epoxy Floor Sealer.

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.

2.3 REGULATORY REQUIREMENTS/QUALITY ASSURANCE

- A. General: Paint materials shall conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
- B. Volatile Organic Compounds (VOC):
 - 1. General: VOC content of paint materials shall meet requirements meet VOC regulations of authorities having jurisdiction over the Work.

2. VOC content for solvent-based and anti-corrosive paints shall not exceed 250g/l, shall not be formulated with more than one percent aromatic hydro carbons by weight.

C. Lead-Base Paint:

1. 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.
2. 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.
3. For lead-paint removal, see Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.

D. Asbestos: Materials shall not contain asbestos.

E. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.

F. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.

G. Use high performance acrylic paints in place of alkyd paints, where possible.

PART 3 - EXECUTION

3.1 JOB CONDITIONS

A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.

1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each days work.

B. Atmospheric and Surface Conditions:

1. Do not apply coating when air or substrate conditions are:
 - a. Less than 3 degrees C (5 degrees F) above dew point.
 - b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.
2. Maintain interior temperatures until paint dries hard.

3. Do no exterior painting when it is windy and dusty.
4. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
5. Apply only on clean, dry and frost free surfaces except as follows:
 - a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces where allowed by manufacturer's printed instructions.
 - b. Dampened with a fine mist of water on hot dry days concrete and masonry surfaces to which water thinned acrylic and cementitious paints are applied to prevent excessive suction and to cool surface.

3.2 SURFACE PREPARATION

- A. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays.
- B. General:
 1. Remove prefinished items not to be painted such as lighting fixtures, escutcheon plates, hardware, trim, and similar items for reinstallation after paint is dried.
 2. Remove items for reinstallation and complete painting of such items and adjacent areas when item or adjacent surface is not accessible or finish is different.
 3. See other sections of specifications for specified surface conditions and prime coat.
 4. Clean surfaces for painting with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry.
- C. Wood:
 1. Sand to a smooth even surface and then dust off.
 2. Sand surfaces showing raised grain smooth between each coat.
 3. Wipe surface with a tack rag prior to applying finish.
 4. Surface painted with an opaque finish:
 - a. Coat knots, sap and pitch streaks with MPI 36 (Knot Sealer) before applying paint.
 - b. Apply two coats of MPI 36 (Knot Sealer) over large knots.
 5. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
 6. Fill open grained wood such as oak, walnut, ash and mahogany with MPI 91 (Wood Filler Paste), colored to match wood color.
 - a. Thin filler in accordance with manufacturer's instructions for application.

- b. Remove excess filler, wipe as clean as possible, dry, and sand as specified.
- D. Ferrous Metals:
- 1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
 - 2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning). Exception: where high temperature aluminum paint is used, prepare surface in accordance with paint manufacturer's instructions.
 - 3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
 - a. This includes flat head countersunk screws used for permanent anchors.
 - b. Do not fill screws of item intended for removal such as glazing beads.
 - 4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
 - 5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.
- E. Zinc-Coated (Galvanized) Metal, Surfaces Specified Painted:
- 1. Clean surfaces to remove grease, oil and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).
 - 2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items with MPI 18 (Organic Zinc Rich Coating). Prime or spot prime with metal primer as specified in this Section.
- F. Masonry and Concrete:
- 1. Clean and remove dust, dirt, oil, grease efflorescence, form release agents, laitance, and other deterrents to paint adhesion.
 - 2. Use emulsion type cleaning agents to remove oil, grease, paint and similar products. Use of solvents, acid, or steam is not permitted.
 - 3. Remove loose mortar in masonry work.
 - 4. Replace mortar and fill open joints, holes, cracks and depressions. Do not fill weep holes. Finish to match adjacent surfaces.

5. Neutralize concrete floors to be painted by washing with a solution of 1.4 Kg (3 pounds) of zinc sulfate crystals to 3.8 L (1 gallon) of water, allow to dry three days and brush thoroughly free of crystals.
6. Repair broken and spalled concrete edges with concrete patching compound to match adjacent surfaces as specified in CONCRETE Sections. Remove projections to level of adjacent surface by grinding or similar methods.

G. Gypsum Board:

1. Remove loose finishing materials.
2. Remove dust, dirt, and other deterrents to paint adhesion.
3. Fill holes, cracks, and other depressions with CID-A-A-1272A [Plaster, Gypsum (Spackling Compound) finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

3.3 PAINT PREPARATION

- A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
- B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
- C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.
- D. Mix two component and two part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.
- E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.4 APPLICATION

- A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
- B. Unless otherwise specified, apply paint in three coats; prime, body, and finish. When two coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
- C. Apply each coat evenly and cover substrate completely.
- D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by the Contracting Officer's Technical Representative.
- E. Finish surfaces to show solid even color, free from runs, lumps, brushmarks, laps, holidays, or other defects.

- F. Apply by brush, roller or spray, except as otherwise specified.
- G. Do not spray paint in existing occupied spaces unless approved by the Contracting Officer's Technical Representative, except in spaces sealed from existing occupied spaces.
 - 1. Apply painting materials specifically required by manufacturer to be applied by spraying.
 - 2. In areas, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in WORK NOT PAINTED, motors, controls, telephone, and electrical equipment, fronts of sterilizes and other recessed equipment and similar prefinished items.
- H. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

3.5 PRIME PAINTING

- A. After surface preparation prime surfaces before application of body and finish coats, except as otherwise specified.
- B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.
- C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.
- D. Prime rebates for stop and face glazing of wood, and for face glazing of steel.
- E. Concrete and Concrete Masonry Units:
 - 1. System: MPI 4 (Block Filler, Latex, Interior/Exterior)
 - 2. Acceptable Products:
 - a. Benjamin Moore & Co., Super Spec Latex Block Filler 160, or equal, as acceptable to Owner and Architect.
- F. Metal:
 - 1. General: Ferrous and non-ferrous metals, except factory finished metals, boilers, incinerator stacks, and engine exhaust pipes.
 - 2. Exterior Metal:
 - a. Ferrous and Non-Ferrous Metal:
 - 1) System: MPI 163 (Light Industrial Acrylic Coating, Water Based, Exterior, Semi-Gloss (MPI Gloss Level 5)), self-priming.
 - 2) Acceptable Products:
 - a) Benjamin Moore & Co., Super Spec HP D.T.M. Acrylic Semi-Gloss, or equal, as acceptable to Owner and Architect.

- b. Machinery:
 - 1) System: MPI 163 (Light Acrylic Industrial Coating, Water Based, Exterior, Semi-Gloss (MPI Gloss Level 5)), self-priming.
 - 2) Acceptable Products:
 - a) Benjamin Moore & Co., Super Spec HP D.T.M. Acrylic Semi-Gloss, or equal, as acceptable to Owner and Architect.
- 3. Interior Metal:
 - a. Ferrous and Non-Ferrous Metal:
 - 1) System: MPI 153 (Light Industrial Acrylic Coating, Water Based, Interior, Semi-Gloss (MPI Gloss Level 5)), self-priming.
 - 2) Acceptable Products:
 - a) Benjamin Moore & Co., Super Spec HP D.T.M. Acrylic Semi-Gloss, or equal, as acceptable to Owner and Architect.
 - b. Machinery:
 - 1) System: MPI 153 (Light Industrial Acrylic Coating, Water Based, Interior, Semi-Gloss (MPI Gloss Level 5)), self-priming.
 - 2) Acceptable Products:
 - a) Benjamin Moore & Co., Super Spec HP D.T.M. Acrylic Semi-Gloss, or equal, as acceptable to Owner and Architect.
- G. Gypsum Board:
 - 1. Typical:
 - a. System: MPI 149 X-Green (Primer Sealer, Interior, Institutional Low Odor/VOC)
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Eco Spec WB Interior Latex Primer 372, or equal, as acceptable to Owner and Architect.
 - 2. Bathrooms/Kitchen Spaces:
 - a. System: MPI 137 (Primer, Stain Blocking, Water Based)
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Fresh Start All Purpose 100% Acrylic Primer 023, or equal, as acceptable to Owner and Architect.
 - 3. Gypsum Board Surfaces to Receive Wall Covering:
 - a. System: MPI 137 (Primer, Stain Blocking, Water Based)
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Fresh Start All Purpose 100% Acrylic Primer 023, or equal, as acceptable to Owner and Architect.
- H. Wood and Wood Particleboard:
 - 1. General:
 - a. Use same kind of primer specified for exposed face surface.

- b. Back prime and seal ends of exterior woodwork, and edges of exterior plywood specified to be finished.
- 2. Interior Wood - Opaque Finish:
 - a. System: MPI 137 (Primer, Stain Blocking, Water Based)
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Fresh Start All Purpose 100% Acrylic Primer 023, or equal, as acceptable to Owner and Architect.
- 3. Unfinished Woodwork:
 - a. General: Apply one coat of primer/sealer as soon as delivered to site to surfaces of unfinished woodwork, except concealed surfaces of shop fabricated or assembled millwork and surfaces specified to have varnish, stain or natural finish.
 - b. System: MPI 169 (Primer, Latex for Exterior Wood) or MPI 137 (Primer, Stain Blocking, Water Based) for exterior and interior work respectively.
 - c. Acceptable Products:
 - 1) Benjamin Moore & Co., Super Spec Latex Exterior Primer 169, or equal, as acceptable to Owner and Architect, or
 - 2) Benjamin Moore & Co., Fresh Start All Purpose 100% Acrylic Primer 023, or equal, as acceptable to Owner and Architect.

3.6 EXTERIOR FINISHES

- A. General: Apply following finish coats where indicated by Contract Documents.
- B. Metal:
 - 1. General: Ferrous and non-ferrous metals, except factory finished metals, boilers, incinerator stacks, and engine exhaust pipes.
 - 2. Ferrous and Non-Ferrous Metal:
 - a. System: 2 coats, MPI 163 (Light Industrial Acrylic Coating, Water Based, Exterior, Semi-Gloss (MPI Gloss Level 5))
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Super Spec HP D.T.M. Acrylic Semi-Gloss, or equal, as acceptable to Owner and Architect.
 - 3. Machinery:
 - a. System: 2 coats, MPI 164 (Light Industrial Acrylic Coating, Exterior, Water Based, Gloss (MPI Gloss Level 6)).
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Super Spec HP D.T.M. Acrylic Gloss, or equal, as acceptable to Owner and Architect.

3.7 INTERIOR FINISHES

- A. General: Apply following finish coats over prime coats in spaces or on surfaces where indicated by Contract Documents.
- B. Concrete and Masonry Walls:
 - 1. System: 2 coats, MPI 145 X-Green (Latex, Interior, Institutional Low Odor/VOC (MPI Gloss Level 3))
 - 2. Acceptable Products:
 - a. Benjamin Moore & Co., Eco Spec WB Interior Latex Eggshell Finish 374, or equal, as acceptable to Owner and Architect.
- C. Metal:
 - 1. General:
 - a. Apply to exposed surfaces.
 - b. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
 - 2. Ferrous and Non-Ferrous Metal:
 - a. System: 2 coats, MPI 153 (Light Industrial Acrylic Coating, Water Based, Interior, Semi-Gloss (MPI Gloss Level 5))
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Super Spec HP D.T.M. Acrylic Semi-Gloss, or equal, as acceptable to Owner and Architect.
 - 3. Machinery:
 - a. System: 2 coats, MPI 154 (Light Industrial Acrylic Coating, Interior, Water Based, Gloss (MPI Gloss Level 6)).
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Super Spec HP D.T.M. Acrylic Gloss, or equal, as acceptable to Owner and Architect.
- D. Gypsum Board:
 - 1. Typical:
 - a. System: 2 coats, MPI 145 X-Green (Latex, Interior, Institutional Low Odor/VOC (MPI Gloss Level 3))
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Eco Spec WB Interior Latex Eggshell Finish 374, or equal, as acceptable to Owner and Architect.
 - 2. Bathrooms, Fitness Rooms, Locker Rooms, and Kitchen Spaces:
 - a. System: 2 coats, MPI 215 (Epoxy-Modified Latex, Interior Semi-Gloss (MPI Gloss Level 5))
 - b. Acceptable Products:
 - 1) Benjamin Moore & Co., Super Spec Interior Acrylic Epoxy Coating 256, or equal, as acceptable to Owner and Architect.

3. Ceilings:

- a. System: 2 coats, MPI 143 X-Green (Latex, Interior, Institutional Low Odor/VOC, Flat (MPI Gloss Level 1)).
- b. Acceptable Products:
 - 1) Benjamin Moore & Co., Eco Spec WB Interior Latex Flat Finish 373 or equal, as acceptable to Owner and Architect.

E. Wood:

1. General:

- a. Sanding:
 - 1) Use 220-grit sandpaper.
 - 2) Sand sealers and varnish between coats.
 - 3) Sand enough to scarify surface to assure good adhesion of subsequent coats, to level roughly applied sealer and varnish, and to knock off "whiskers" of any raised grain as well as dust particles.
- b. Sealers:
 - 1) Apply sealers specified except sealer may be omitted where pigmented, penetrating, or wiping stains containing resins are used.
 - 2) Allow manufacturer's recommended drying time before sanding, but not less than 24 hours or 36 hours in damp or muggy weather.
 - 3) Sand as specified.

2. Wood - Opaque Finish: Wood surfaces, including site finished doors and trim, to receive opaque painted finish:

- a. System: 2 coats MPI 54 X-Green (Latex, Interior, Semi-Gloss (MPI Gloss Level 5)).
- b. Acceptable Products:
 - 1) Benjamin Moore & Co., Aura Waterborne Interior Paint Semi-Gloss Finish 528, or equal, as acceptable to Owner and Architect.

3.8 REFINISHING EXISTING PAINTED SURFACES

- A. Clean, patch and repair existing surfaces as specified under surface preparation.
- B. Remove and reinstall items as specified under surface preparation.
- C. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.
- D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.
- E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.

- F. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.
- G. Sand or dull glossy surfaces prior to painting.
- H. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.9 PAINT COLOR

- A. Samples: Prior to beginning work, Architect will furnish color chips for surfaces to be painted. Use representative colors when preparing samples for review. Submit samples for review. Samples will be reviewed only for visual characteristics, including color, finish, texture and sheen. Provide a listing of material and application for each coat of each finish sample.
 - 1. General: Submit 3 drawdowns of each product and color combination. Drawdown shall be applied using a 4 mil wet film thickness drawdown bar on Leneta Form WD white coated cards, size 4" x 6" minimum. Label each card with project name, date, product name and number, color number as stated in color schedule, and name, address and telephone number of supplying facility. Resubmit until acceptable color and sheen is achieved.
 - 2. Actual Surfaces: On actual outdoor and indoor building surfaces and components to be painted, duplicate painted finishes of prepared samples meeting requirements of PDCA P5. On at least 100 square feet of surface as directed, provide full coat finish samples until required sheen, color and texture is obtained. Provide finished lighting conditions for review of painted surfaces.
 - 3. Final Aesthetic Acceptance: Final acceptance of colors, sheens and textures will be from sample areas with paint applied to actual building surfaces at project site.
- B. Coat Colors:
 - 1. Color of priming coat: Lighter than body coat.
 - 2. Color of body coat: Lighter than finish coat.
 - 3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.
- C. Painting, Caulking, Closures, and Fillers Adjacent to Casework:
 - 1. Paint to match color of casework where casework has a paint finish.
 - 2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.10 PAINT COLOR AND GLOSS SCHEDULE:

- A. Exterior Colors: As selected by Architect.

B. Interior Colors: Colors and gloss to match following as acceptable to Owner and Architect:

1. P-1:

a. Color: Benjamin Moore & Co., Acadia White OC-38.

b. Gloss:

1) Gypsum Board: Eggshell.

2) Metal and Wood Trim: Semi-gloss.

2. P-2:

a. Color: Benjamin Moore & Co., Berkshire Beige, AC-2.

b. Gloss:

1) Gypsum Board: Eggshell.

2) Metal and Wood Trim: Semi-gloss.

3.11 MECHANICAL AND ELECTRICAL WORK FIELD PAINTING SCHEDULE

- A. Field painting of mechanical and electrical consists of cleaning, touching-up abraded shop prime coats, and applying prime, body and finish coats to materials and equipment if not factory finished in space scheduled to be finished.
- B. Paint various systems specified in Division 02 - EXISTING CONDITIONS, Division 21 - FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 - HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 - ELECTRONIC SAFETY AND SECURITY.
- C. Paint after tests have been completed.
- D. Omit prime coat from factory prime-coated items.
- E. Finish painting of mechanical and electrical equipment is not required when located above suspended ceilings, in concealed areas such as pipe and electric closets, pipe basements, pipe tunnels, trenches, attics, roof spaces, shafts and furred spaces except on electrical conduit containing feeders 600 volts or more.
- F. Omit field painting of items specified in paragraph, Building and Structural WORK NOT PAINTED.
- G. Color:
 - 1. Paint items having no color specified to match surrounding surfaces.
 - 2. Paint colors as indicated, except for following:
 - a. White Exterior unfinished surfaces of enameled plumbing fixtures. Insulation coverings on breeching and uptake inside boiler house, drums and drum-heads, oil heaters, condensate tanks and condensate piping.

- b. Gray: Heating, ventilating, air conditioning and refrigeration equipment (except as required to match surrounding surfaces), and water and sewage treatment equipment and sewage ejection equipment.
 - c. Aluminum Color: Ferrous metal on outside of boilers and in connection with boiler settings including supporting doors and door frames and fuel oil burning equipment, and steam generation system (bare piping, fittings, hangers, supports, valves, traps and miscellaneous iron work in contact with pipe).
 - d. Federal Safety Red: Exposed fire protection piping hydrants, post indicators, electrical conducts containing fire alarm control wiring, and fire alarm equipment.
 - e. Federal Safety Orange: .Entire lengths of electrical conduits containing feeders 600 volts or more.
 - f. Color to match brickwork sheet metal covering on breeching outside of exterior wall of boiler house.
- H. Apply paint systems on properly prepared and primed surface as follows:
- 1. Interior Locations:
 - a. Apply two coats of MPI 153 (Light Industrial Acrylic Coating, Water Based, Interior, Semi-Gloss (MPI Gloss Level 5)) to following items:
 - 1) Metal under 94 degrees C (200 degrees F) of items such as bare piping, fittings, hangers and supports.
 - 2) Equipment and systems such as hinged covers and frames for control cabinets and boxes, cast-iron radiators, electric conduits and panel boards.
 - 3) Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.
 - b. Paint electrical conduits containing cables rated 600 volts or more using two coats of MPI 153 (Light Industrial Acrylic Coating, Water Based, Interior, Semi-Gloss (MPI Gloss Level 5)) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.

3.12 BUILDING AND STRUCTURAL WORK FIELD PAINTING

- A. Painting and finishing of interior and exterior work except as specified under Paragraph - Building and Structural Work Not Painted, of this Article.
 - 1. Painting and finishing of new and existing work.
 - 2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
 - 3. Painting of ferrous metal and galvanized metal.
 - 4. Identity painting and safety painting.

B. Building and Structural Work Not Painted:

1. Prefinished items:
 - a. Casework, doors, elevator entrances and cabs, metal panels, wall covering, and similar items specified factory finished under other sections.
 - b. Factory finished equipment and pre-engineered metal building components such as metal roof and wall panels.
2. Finished surfaces:
 - a. Hardware except ferrous metal.
 - b. Anodized aluminum, stainless steel, chromium plating, copper, and brass, except as otherwise specified.
 - c. Signs, fixtures, and other similar items integrally finished.
3. Concealed surfaces:
 - a. Inside duct shafts, pipe basements, crawl spaces, pipe tunnels, above ceilings, attics, except as otherwise specified.
 - b. Inside walls or other spaces behind access doors or panels.
 - c. Surfaces concealed behind permanently installed casework and equipment.
4. Moving and operating parts:
 - a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
 - b. Tracks for overhead or coiling doors, shutters, and grilles.
5. Labels:
 - a. Code required label, such as Underwriters Laboratories Inc., Inchcape Testing Services, Inc., or Factory Mutual Research Corporation.
 - b. Identification plates, instruction plates, performance rating, and nomenclature.
6. Galvanized metal:
 - a. Exterior chain link fence and gates, corrugated metal areaways, and gratings.
 - b. Except where specifically specified to be painted.
7. Metal safety treads and nosings.
8. Gaskets.
9. Concrete curbs, gutters, pavements, retaining walls, exterior exposed foundations walls and interior walls in pipe basements.
10. Face brick.
11. Structural steel encased in concrete, masonry, or other enclosure.
12. Ceilings, walls, columns in interstitial spaces.
13. Ceilings, walls, and columns in pipe basements.

3.13 IDENTITY PAINTING SCHEDULE

- A. Identify designated service in accordance with ANSI A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels.
1. Legend may be identified using 2.1 G options or by stencil applications.
 2. Apply legends adjacent to changes in direction, on branches, where pipes pass through walls or floors, adjacent to operating accessories such as valves, regulators, strainers and cleanouts a minimum of 12 000 mm (40 feet) apart on straight runs of piping. Identification next to plumbing fixtures is not required.
 3. Locate Legends clearly visible from operating position.
 4. Use arrow to indicate direction of flow.
 5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert working pressure shown on drawings where asterisk appears for High, Medium, and Low Pressure designations as follows:
 - a. High Pressure - 414 kPa (60 psig) and above.
 - b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).
 - c. Low Pressure - 103 kPa (14 psig) and below.
 - d. Add Fuel oil grade numbers.
 6. Legend name in full or in abbreviated form as follows:

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND BBREVIATIONS
Drain Line		Green	White	Drain
High Pressure Steam		Yellow	Black	H.P. _____*
High Pressure Condensate Return		Yellow	Black	H.P. Ret _____*
Medium Pressure Steam		Yellow	Black	M. P. Stm _____*
Medium Pressure Condensate Return		Yellow	Black	M.P. Ret _____*
Low Pressure Steam		Yellow	Black	L.P. Stm _____*
Low Pressure Condensate Return		Yellow	Black	L.P. Ret _____*
Gravity Condensate Return		Yellow	Black	Gravity Cond Ret
Pumped Condensate Return		Yellow	Black	Pumped Cond Ret
Chemical Feed		Yellow	Black	Chem Feed
Pumped Condensate		Black		Pump Cond
Pump Recirculating		Yellow	Black	Pump-Recirc.

Vent Line		Yellow	Black	Vent
Cold Water (Domestic)	White	Green	White	C.W. Dom
Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
Sanitary Waste		Green	White	San Waste
Sanitary Vent		Green	White	San Vent
Pump Drainage		Green	White	Pump Disch
Atmospheric Vent		Green	White	ATV
Fire Protection Water				
Sprinkler		Red	White	Auto Spr
Standpipe		Red	White	Stand
Sprinkler		Red	White	Drain

7. Electrical Conduits containing feeders over 600 volts, paint legends using 50 mm (2 inch) high black numbers and letters, showing the voltage class rating. Provide legends where conduits pass through walls and floors and at maximum 6100 mm (20 foot) intervals in between. Use labels with yellow background with black border and words Danger High Voltage Class, 5000, 15000, or 25000 as applicable.

8. See Sections for methods of identification, legends, and abbreviations of the following:

- a. Conduits containing high voltage feeders over 600 volts: Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS, Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS, and Section 28 05 28.33, CONDUITS AND BACKBOXES FOR ELECTRONIC SAFETY AND SECURITY.

B. Fire and Smoke Partitions:

- 1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high.
- 2. Stenciled message: "SMOKE BARRIER" or, "FIRE BARRIER" as applicable.
- 3. Locate not more than 6100 mm (20 feet) on center on corridor sides of partitions, and with a least one message per room on room side of partition.
- 4. Use semigloss paint of color that contrasts with color of substrate.

3.14 PROTECTION CLEAN UP, AND TOUCH-UP

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.

C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

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SECTION 10 11 23
TACKBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies white boards, tack boards and related items.
- B. Boards may be either factory or field assembled.

1.2 QUALITY ASSURANCE

- A. Boards shall be the products of one manufacturer.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Shop Drawings: Identifying all parts by name and material and showing design, construction, installation, anchorage and relation to adjacent construction.
- C. Manufacturer's Literature and Data:
 - 1. Tackboard.
 - 1. White board.
- D. Samples:
 - 1. Tackboard, 300 mm by 300 mm (six by six inches), each color, mounted on backing.
 - 2. White board, 300mm by 300mm (6 inches by 6 inches), mounted on backing.
 - 3. Clear anodized aluminum, 300 mm (six inch) length.
 - 4. Each accessory (after approval, may be used in the work).

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. National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500 Series.....Metal Finishes Manual
 - AMP 501.....Finishes for Aluminum
- C. American National Standards (ANSI):
 - Z97.1-04.....Safety Glazing Materials Used in Buildings -
Safety Performance Specifications and Methods of
Test

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

B221/B221M-06.....Aluminum and Aluminum Alloy Extruded Bars, Rods,
Wire, Shapes and Tubes

C1036-06.....Flat Glass

C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated
and Uncoated Glass

F104-03.....Nonmetallic Gasket Materials

E. Composite Panel Association (CPA):

A208.1-06.....Particleboard

A135.4-04.....Basic Hardboard

PART 2 - PRODUCTS**2.1 TACKBOARD**

- A. Tackable Surface: Pure grain natural cork, without burlap backing, laminated to 6mm (1/4 inch) thick hardboard or particleboard backing.
- B. Frames: Extruded aluminum 16mm (5/8 inch) thick, clear anodized.
- C. Size: 900mm x 1200mm (36 inches x 48 inches).

2.3 WHITE BOARD

- A. Writing Surface: Porcelain enamel coated steel.
- B. Core Material: Medium density fiberboard, 11mm (7/16 inch) thick.
- C. Frames: Extruded aluminum 16mm (5/8 inch) thick, clear anodized.
- D. Display Rail: Continuous tackable rail of extruded aluminum to match frame, with natural core insert and end strips, located at top of each whiteboard.
- E. Marker Tray: Standard, continuous blade-type aluminum tray with ribbed sections and end closures, at bottom of each white board. Finish shall match frames.
- F. Size: 900mm x 1200mm (36 inches x 48 inches) and 900mm x 2400mm (36 inches x 96 inches).

2.4 FINISHES

- A. Finish exposed aluminum surfaces as follows:
 - 1. AA 45 chemically etched medium matte, with clear anodic coating, Class II Architectural, 0.4 mils thick (AA-M12C22A32).

PART 3 - EXECUTION**3.1 INSTALLATION - GENERAL**

- A. Install units in accordance with the manufacturer's installation instructions, use concealed fasteners.

- B. Inspect surfaces and related construction to receive units. Partitions shall have reinforcing to receive fasteners. Verify type and placement of reinforcement.
- C. Do not proceed with the installation until reinforcement is in place and surfaces are flat.
- D. Assemble units as specified by the manufacturer.

3.2 INSTALLATION OF TACKBOARDS AND WHITE BOARDS

- A. Install boards meeting instructions and recommendations of manufacturer.
- B. Unless otherwise indicated or required by manufacturer, mount tack boards and white boards with adhesive and blocking pads spaced 16 inches on center each way.
 - 1. Grounds designed to receive clips for snap-on trim shall be continuous and be secured 300 mm (12 inches) on center. Space clips 300 mm (12 inches) on center.
 - 2. Miter trim at corners, conceal fasteners. Modify trim as required to conform to surrounding construction details.

3.3 TACKBOARD SCHEDULE

- A. Tackboard F3010:
 - 1. Description: Aluminum framed tackboard.
 - 2. Size: 1200mm x 1200 mm (48 inches x 48 inches).
- B. White Board F3050:
 - 1. Description: Aluminum framed white board with marker tray and tackable display rail.
 - 2. Size: 900mm x 1200 mm (36 inches x 48 inches).

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SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior signage for room numbers, directional signs and code required signs.

1.2 RELATED WORK

- A. Lighted EXIT signs for egress purposes are specified under Division 26, ELECTRICAL.

1.3 MANUFACTURER'S QUALIFICATIONS

- A. Sign manufacturer shall provide evidence that they regularly and presently manufacturers signs similar to those specified in this section as one of their principal products.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Samples: Holder, insert and copy in colors specified, each type. Submit 2 sets. One set of samples will be retained by Contracting Officer's Technical Representative, other returned to Contractor.
 - 1. Color and vinyl samples of each color, 150 mm x 150 mm (6 inches x 6 inches. Show anticipated range of color and texture.
 - 2. Sample of typeface, arrow and symbols in a typical full size layout.
- C. Manufacturer's Literature:
 - 1. Showing the methods and procedures proposed for the concealed anchorage of the signage system to each surface type.
 - 2. Manufacturer's printed specifications, anchorage details, installation and maintenance instructions.
- D. Samples: Sign location plan, showing location, type and total number of signs required.
- E. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.
- F. Full size layout patterns for dimensional letters.

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 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):
B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate
- C. Federal Specifications (Fed Spec):
MIL-PRF-8184F.....Plastic Sheet, Acrylic, Modified.
- D. Manual on Uniform Traffic Control Devices (MUTCD)

1.7 MINIMUM SIGN REQUIREMENTS

- A. Permanent Rooms and Spaces:
 - 1. Tactile and Braille Characters, raised minimum 0.793 mm (1/32 in). Characters shall be accompanied by Grade 2 Braille.
 - 2. Type Styles: Characters shall be uppercase, Helvetica Medium, Helvetica Medium Condensed and Helvetica Regular.
 - 3. Character Height: Minimum 16 mm (5/8 in) high, Maximum 50 mm (2 in).
 - 4. Symbols (Pictograms): Equivalent written description shall be placed directly below symbol, outside of symbol's background field. Border dimensions of symbol background shall be minimum 150 mm (6 in) high.
 - 5. Finish and Contrast: Characters and background shall be eggshell, matte or other non-glare finish with adequate contrast with background.
 - 6. Mounting Location and Height: As shown. Mounted on wall adjacent to the latch side of the door and to avoid door swing and protruding objects.
- B. Overhead Signs:
 - 1. Type Styles: As shown. Characters shall have a width-to-height ratio between 3:5 and 1:1. Characters shall have a stroke width-to-height ratio of between 1:5 and 1:10.
 - 2. Character Height: minimum 75 mm (3 in) high for overhead signs. As shown, for directional signs.
 - 3. Finish and Contrast: Same as for signs of permanent rooms and spaces.
 - 4. Mounting Location and Height: As shown.

1.8 COLORS AND FINISHES:

- A. As indicated on Drawings.

PART 2 - PRODUCTS**2.1 GENERAL**

- A. Signs of type, size and design shown on the drawings and as specified.
- B. Signs complete with lettering 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 drawings for dimensions. Contractor to verify and be responsible for all dimensions and conditions shown by these drawings. Contracting Officer's Technical Representative to be notified of any discrepancy in drawing, in field directions or conditions, and/or of any changes required for all such construction details.
- E. The Sign Contractor, by commencing work of this section, assumes overall responsibility, as part of his warranty of work, to assure that assemblies, components and parts shown or required within the work of the section, comply with the Contract Documents. The Contractor shall further warrant: That all components, specified or required to satisfactorily complete the installation are compatible with each other and with conditions of installations.

2.2 PRODUCTS

- A. APCO: Arcadia-Curved Face Sign System.
- B. Aluminum:
 - 1. Sheet and Plate: ASTM B209.
- C. Cast Acrylic Sheet: MIL-PRF-8184F; Type II, class 1, Water white non-glare optically clear. Matt finish water white clear acrylic shall not be acceptable.
- D. Vinyl: 0.1 mm thick machine cut, having a pressure sensitive adhesive and integral colors.

2.3 SIGN STANDARDS

- A. Topography:
 - 1. Type Style: Helvetica Medium and Helvetica Bold. Initial caps or all caps as indicated in Sign Message Schedule.
 - 2. Arrow: See graphic standards in drawings.
 - 3. Letter spacing: See graphic standards on drawings.
 - 4. Letter spacing: See graphic standards on drawings.

5. All text, arrows, and symbols to be provided in size, colors, typefaces and letter spacing shown. Text shall be a true, clean, accurate reproduction of typeface(s) shown. Text shown in drawings are for layout purposes only; final text for signs is listed in Sign Message Schedule.

B. Project Colors and Finishes: As indicated on Drawings.

2.4 SIGN TYPES

A. General:

1. The interior sign system is comprised of sign types families that are identified by a letter and number which identify a particular group of signs. An additional number identifies a specific type of sign within that family.

B. Sign Type Family 01:

1. IN-01.01: Apco Arcadia.
2. IN-01.10 & IN-01.11: Refer to Sign Type 03 specification for tactile and Braille portion of sign.
3. IN-01.02: All text and graphics are to be first surface vinyl letters.
4. IN-01.1: Preparation of artwork for reproduction of "fire and emergency evacuation maps" is by manufacturer.

C. Sign Type Families 03:

1. IN-03.01: Apco Arcadia.
2. Tactile sign is to be made from a material that provides for letters, numbers and Braille to be integral with sign plaque material such as: photosensitive polyamide resin, etched metal, sandblasted phenolic or embossed material. Do not apply letters, numbers and Braille with adhesive.
3. Numbers, letters and Braille to be raised 0.793 mm (.0312 inches) from the background surface. The draft of the letters, numbers and Braille to be tapered, vertical and clean.
4. Braille dots are to conform with standard dimensions for literary Braille; (a) Dot base diameter: 1.5 mm (.059 inches) (b) Inter-dot spacing: 2.3 mm (.090 inches) (c) Horizontal separation between cells: 6.0 mm (.241 inches) (d) Vertical separation between cells: 10.0 mm (.395 inches)
5. Entire assembly is painted in specified color. After painting, apply white or other specified color to surface of the numbers and letters. Entire sign is to have a protective clear coat sealant applied.
6. Complete sign is to have an eggshell finish (11 to 19 degree on a 60 degree glossmeter).

D. Sign Type Family 07, 09:

1. All text and graphics are to be first surface applied vinyl letters except for under sliding tile.
2. Refer to sign type 03 specifications for tactile and Braille portion of sign.
3. Protect text, which is covered by sliding tile, so tile does not wear away letters.

E. Sign Type Family 13:

1. All text and graphics are to be first surface applied vinyl letters.

F. Sign Type Family 14, 15, and 17:

1. IN-14.01, IN-14.05, IN-15.09, IN-17.01: Apco Arcadia.
2. Ceiling mounted signs required mounting hardware on the sign that allows for sign disconnection, removal and reinstallation

G. Sign Type Family 19:

1. Dimensional letters are waterjet cut solid stainless in the size and thickness noted in the drawings.
2. Draft of letters is perpendicular to letters face.
3. All corners such as where a letter stem and bar intersect are to be square so the letter form is accurately reproduced.

2.5 FABRICATION

- A. Design components to allow for expansion and contraction for a minimum material temperature range of 56 °C (100 °F), without causing buckling, excessive opening of joints or over stressing of adhesives, welds and fasteners.
- B. Form work to required shapes and sizes, with true curve lines and angles. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners whenever and wherever possible.
- C. Shop fabricate so far as practicable. Joints fastened flush to conceal reinforcement, or welded where thickness or section permits.
- D. Contact surfaces of connected members be true. Assembled so joints will be tight and practically unnoticeable, without use of filling compound.
- E. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern. Plane surfaces be smooth flat and without oil-canning, free of rack and twist. Maximum variation from plane of surface plus or minus 0.3 mm (0.015 inches). Restore texture to filed or cut areas.
- F. Level or straighten wrought work. Members shall have sharp lines and angles and smooth surfaces.
- G. Extruded members to be free from extrusion marks. Square turns and corners sharp, curves true.

- H. Drill holes for bolts and screws. Conceal fastenings where possible. Exposed ends and edges mill smooth, with corners slightly rounded. Form joints exposed to weather to exclude water.
- I. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Edge joints tightly mitered to give appearance of solid material.
- J. All painted surfaces properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.
- K. Movable parts, including hardware, are to be cleaned and adjusted to operate as designed without binding or deformation of members. Doors and covers centered in opening or frame. All contact surfaces fit tight and even without forcing or warping components.
- L. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.
- M. No signs are to be manufactured until final sign message schedule and location review has been completed by the Contracting Officer's Technical Representative & forwarded to contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Protect products against damage during field handling and installation. Protect adjacent existing and newly placed construction, landscaping and finishes as necessary to prevent damage during installation. Paint and touch up any exposed fasteners and connecting hardware to match color and finish of surrounding surface.
- B. Mount signs in proper alignment, level and plumb according to the sign location plan and the dimensions given on elevation and sign location drawings. Where otherwise not dimensioned, signs shall be installed where best suited to provide a consistent appearance throughout the project. When exact position, angle, height or location is in doubt, contact Contracting Officer's Technical Representative for clarification.
- C. Contractor shall be responsible for all signs that are damaged, lost or stolen while materials are on the job site and up until the completion and final acceptance of the job.

- D. Remove or correct signs or installation work Contracting Officer's Technical Representative determines as unsafe or as an unsafe condition.
- E. At completion of sign installation, clean exposed sign surfaces. Clean and repair any adjoining surfaces and landscaping that became soiled or damaged as a result of installation of signs.
- F. Locate signs as shown on the Sign Location Plans.
- G. Certain signs may be installed on glass. A blank glass back up is required to be placed on opposite side of glass exactly behind sign being installed. This blank glass back up is to be the same size as sign being installed.
- H. Contractor will be responsible for verifying that behind each sign location there are no utility lines that will be affected by installation of signs. Any damage during installation of signs to utilities will be the sole responsibility of the Contractor to correct and repair.
- I. Furnish inserts and anchoring devices which must be set in concrete or other material for installation of signs. Provide setting drawings, templates, instructions and directions for installation of anchorage devices which may involve other trades.

- - - END - - -

SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies wall guards.

1.2 RELATED WORK

- A. Structural steel corner guards: Section 05 50 00, METAL FABRICATIONS.
B. Armor plates and kick plates not specified in this section: Section 08 71 00, DOOR HARDWARE.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Shop Drawings: Show design and installation details.
C. Manufacturer's Literature and Data:
1. Wall Guards.
D. Test Report: Showing that resilient material complies with specified fire and safety code requirements.

1.4 DELIVERY AND STORAGE

- A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer.
B. Protect from damage from handling and construction operations before, during and after installation.
C. Store in a dry environment of approximately 21° C (70 degrees F) for at least 48 hours prior to installation.

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 Society for Testing and Materials (ASTM):
D256-06.....Impact Resistance of Plastics
D635-06.....Rate of Burning and/or Extent and Time of
Burning of Self-Supporting Plastics in a
Horizontal Position
E84-09.....Surface Burning Characteristics of Building
Materials
C. Society of American Automotive Engineers (SAE):
J 1545-05.....Instrumental Color Difference Measurement for
Exterior Finishes.

D. Underwriters Laboratories Inc. (UL):
Annual Issue.....Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS

A. Resilient Material:

1. Extruded and injection molded acrylic vinyl or extruded polyvinyl chloride meeting following requirements:
 - a. Minimum impact resistance of 1197 ps (25 ft lbs per sq.ft) when tested in accordance with ASTM D256 (Izod impact, ft.lbs. per inch notch).
 - b. Class 1 fire rating when tested in accordance with ASTM E84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less.
 - c. Rated self extinguishing when tested in accordance with ASTM D635.
 - d. Material shall be labeled and tested by Underwriters Laboratories or other approved independent testing laboratory.
 - e. Integral color with all colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.
 - f. Same finish on exposed surfaces.

2.2 WALL GUARDS

A. Resilient Wall Guards:

1. Wall Guards (Crash Rails): Provide for self adhesive tape installation of extruded .060 inch thick resilient material.
2. Acceptable Products:
 - a. Construction Specialties, Inc., Acrovyn 4000 Rubstrips, or equal as acceptable to Owner and Architect, with tapered upper and lower edges.

2.3 FASTENERS AND ANCHORS

- #### **A. Tape:** Self-adhesive tape standard of manufacturer for securing wall guard extrusions to substrate.

2.4 FINISH

- #### **A. Resilient Material:** Color and texture to match Construction Specialties, Inc., Acrovyn, #373 Amber Cherry as acceptable to Owner and Architect.

PART 3 - INSTALLATION

3.1 RESILIENT WALL GUARDS (CRASH RAIL)

- A. Secure guards to walls with adhesive in accordance with manufacturer's details and instructions.

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SECTION 10 28 00
TOILET ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies manufactured items usually used in dressing rooms, toilets, baths, locker rooms and at sinks in related spaces.
- B. Items Specified:
 - 1. Paper towel dispenser.
 - 2. Combination paper towel dispenser and disposal unit.
 - 3. Waste receptacles.
 - 4. Toilet tissue dispenser.
 - 5. Grab Bars.
 - 6. Shower curtain rods:.
 - 7. Clothes hooks.
 - 8. Towel bars.
 - 9. Metal framed mirror.
 - 10. Automatic soap dispenser.
 - 11. Soap dishes.
 - 12. Sanitary napkin disposal.
 - 13. Utility shelves.
 - 14. Mop racks.
- B. This section also specifies custom fabricated items used in toilets and related spaces.

1.2 SUBMITTALS

- A. Submit in accordance with: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
 - 1. Each product specified.
 - 2. Paper towel dispenser and combination dispenser and disposal units.
 - 3. Metal framed mirrors, showing shelf where required, fillers, and design and installation of units when installed on ceramic tile wainscots and offset surfaces.
 - 4. Shower Curtain rods, showing required length for each location.
 - 5. Grab bars, showing design and each different type of anchorage.
 - 6. Automatic operated soap dispenser, showing anchorage and components.
 - 7. Sanitary napkin disposal.
 - 8. Show material and finish, size of members, and details of construction, installation and anchorage of mop racks.

C. Samples:

1. One of each type of accessory specified.
2. After approval, samples may be used in the work.

D. Manufacturer's Literature and Data:

1. All accessories specified.
2. Show type of material, gages or metal thickness in inches, finishes, and when required, capacity of accessories.
3. Show working operations of spindle for toilet tissue dispensers.
4. Mop racks.

E. Manufacturer's Certificates: Attesting that soap dispensers are fabricated of material that will not be affected by liquid soap or aseptic detergents, Phisohex and solutions containing hexachlorophene.

1.3 QUALITY ASSURANCE

- A. Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- B. Each accessory type shall be the same and be made by the same manufacturer.
- C. Each accessory shall be assembled to the greatest extent possible before delivery to the site.
- D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.4 PACKAGING AND DELIVERY

- A. Pack accessories individually to protect finish.
- B. Deliver accessories to the project only when installation work in rooms is ready to receive them.
- C. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- D. Deliver products to site in sealed packages or containers; labeled for identification with manufacturer's name, brand, and contents.

1.5 STORAGE

- A. Store products in weathertight and dry storage facility.
- B. Protect from damage from handling, weather and construction operations before, during and after installation in accordance with manufacturer's instructions.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

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

A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel
Steel Plate, Sheet and Strip.

A176-99(R2004).....Stainless and Heat-Resisting Chromium Steel
Plate, Sheet, and Strip

A269-07.....Seamless and Welded Austenitic Stainless Steel
Tubing for General Service

A312/A312M-06.....Seamless and Welded Austenitic Stainless Steel
Pipes

A653/A653M-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-
Iron Alloy-Coated (Galvannealed) by the Hot-Dip
Process

B221-06.....Aluminum and Aluminum-Alloy Extruded Bars, Rods,
Wire, Shapes, and Tubes

B456-03.....Electrodeposited Coatings of Copper Plus Nickel
Plus Chromium and Nickel Plus Chromium

C1036-06.....Flat Glass

C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated
and Uncoated Glass

D635-06.....Rate of Burning and/or Extent and Time of
Burning of Self Supporting Plastics in a
Horizontal Position

F446-85 (R2004).....Consumer Safety Specification for Grab Bars and
Accessories Installed in the Bathing Area.

A269-07.....Seamless and Welded Austenitic Stainless Steel
Tubing for General Service

D3453-01.....Flexible Cellular Materials - Urethane for
Furniture and Automotive Cushioning, Bedding,
and Similar Applications

D3690-02.....Vinyl-Coated and Urethane-Coated Upholstery
Fabrics

C. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

AMP 500-505-88.....Metal Finishes Manual and Finishes for Stainless
Steel

D. American Welding Society (AWS):

D10.4-86 (R2000).....Welding Austenitic Chromium-Nickel Stainless
Steel Piping and Tubing

- E. Federal Specifications (Fed. Specs.):
 - A-A-3002.....Mirrors, Glass
 - FF-S-107C (2).....Screw, Tapping and Drive
 - FF-S-107C.....Screw, Tapping and Drive.
 - WW-P-541E(1).....Plumbing Fixtures (Accessories, Land Use) Detail
Specification
- F. United States Department of Justice:
 - ADA.....Americans with Disabilities Act.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel:
 - 1. Plate or sheet: ASTM A167, Type 302, 304, or 304L, except ASTM A176 where Type 430 is specified, 0.0299-inch thick unless otherwise specified.
 - 2. Tube: ASTM A269, Alloy Type 302, 304, or 304L.
- B. Stainless Steel Tubing: ASTM A269, Grade 304 or 304L, seamless or welded.
- C. Stainless Steel Pipe: ASTM A312; Grade TP 304 or TP 304L.
- D. Steel Sheet: ASTM A653, zinc-coated (galvanized) coating designation G90.
- E. Glass: ASTM C1036, Type 1, Class 1, Quality q2, for mirrors, and for mirror doors in medicine cabinets.
- F. Foam Rubber: ASTM D3453, Grade BD, Type 2.

2.2 FASTENERS

- A. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
- B. Concealed Fasteners: Steel, hot-dip galvanized (except in high moisture areas such as showers or bath tubs use stainless steel).
- C. Toggle Bolts: For use in hollow masonry or frame construction.
- D. Hex bolts: For through bolting on thin panels.
- E. Expansion Shields: Lead or plastic as recommended by accessory manufacturer for component and substrate for use in solid masonry or concrete.
- F. Screws:
 - 1. ASME B18.6.4.
 - 2. Fed Spec. FF-S-107, Stainless steel Type A.
- G. Adhesive: Low-VOC, as recommended by manufacturer for products to be joined.

2.3 FINISH

- A. In accordance with NAAMM AMP 500 series.
 - 1. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.
 - 2. Stainless Steel: NAAMM AMP 503, finish number 4.
 - 3. Ferrous Metal:
 - a. Shop Prime: Clean, pretreat and apply one coat of primer and bake.
 - b. Finish: Over primer apply two coats of alkyd or phenolic resin enamel, and bake.
 - 4. Nylon Coated Steel: Nylon coating powder formulated for a fluidized bonding process to steel to provide a hard smooth, medium gloss finish, not less than 0.3 mm (0.012-inch) thick, rated as self-extinguishing when tested in accordance with ASTM D635.

2.4 FABRICATION - GENERAL

- A. Welding, AWS D10.4.
- B. Grind dress, and finish welded joints to match finish of adjacent surface.
- C. Form exposed surfaces from one sheet of stock, free of joints.
- D. Provide steel anchors and components required for secure installation.
- E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents. Reinforce doors to prevent warp or twist.
- F. Hot-dip galvanized steel, except stainless steel, anchors and fastening devices.
- G. Shop assemble accessories and package with all components, anchors, fittings, fasteners and keys.
- H. Key items alike.
- I. Provide templates and rough-in measurements as required.
- J. Round and deburr edges of sheets to remove sharp edges.

2.5 PAPER TOWEL DISPENSERS

- A. Surface mounted type with sloping top.
- B. Dispensing capacity for 300 sheets of any type of paper toweling.
- C. Fabricate of stainless steel.
- D. Provide door with continuous hinge at bottom, and either spring tension cam lock or tumbler lock, keyed alike, at top and a refill sight slot in front.

2.6 COMBINATION PAPER TOWEL DISPENSER AND DISPOSAL UNITS

- A. Semi-recessed type.
- B. Dispensing capacity for 400 sheets of any type of paper toweling.
- C. Fabricate of stainless steel.
- D. Form face frames, from one piece.

- E. Provide each door with continuous stainless steel piano hinge and tumbler lock, keyed alike.
- F. Provide removable waste receptacle approximately 40 liter (10.5 gallon) capacity, fabricated of 0.45 mm (0.018-inch) thick stainless steel.

2.7 TOILET TISSUE DISPENSERS

- A. Double roll surface mounted type.
- B. Mount on continuous backplate.
- C. Removable spindle ABS plastic or chrome plated plastic.
- D. Wood rollers are not acceptable.

2.8 SANITARY NAPKIN DISPOSAL

- A. Description: Unit shall be 0.029 inch thick (22 gage) minimum stainless steel. Provide self-closing door, international graphic symbols identifying napkin disposal and tumbler lock. Receptacle shall be removable, leakproof, rigid molded polyethylene with a 1.2 gallon minimum capacity.
- B. Surface Mounted Unit: Unit for surface mounted installation to serve one toilet compartment.

2.9 GRAB BARS

- A. Fed. Spec WW-P-541/8B, Type IV, bars, surface mounted, Class 2, grab bars and ASTM F446.
- B. Fabricate of stainless steel with peened, knurled or striated safety grip finish:
 - 1. Stainless steel: Grab bars, flanges, mounting plates, supports, screws, bolts, and exposed nuts and washers.
- C. Concealed mount.
- D. Bars:
 - 1. Fabricate from 38 mm (1-1/2 inch) outside diameter tubing.
 - a. Stainless steel, minimum 1.2 mm (0.0478 inch) thick.
 - 2. Fabricate in one continuous piece with ends turned toward walls.
 - 3. Continuous weld intermediate support to the grab bar.
- E. Flange for Concealed Mounting:
 - 1. Minimum of 2.65 mm (0.1046 inch) thick, approximately 75 mm (3 inch) diameter by 13 mm (1/2 inch) deep, with provisions for not less than three set screws for securing flange to back plate.
 - 2. Insert grab bar through center of the flange and continuously weld perimeter of grab bar flush to back side of flange.
- F. In lieu of providing flange for concealed mounting, and back plate as specified, grab rail may be secured by being welded to a back plate and be covered with flange.

G. Back Plates:

1. Minimum 2.65 mm (0.1046 inch) thick metal.
2. Fabricate in one piece, approximately 6 mm (1/4 inch) deep, with diameter sized to fit flange. Provide slotted holes to accommodate anchor bolts.
3. Furnish spreaders, through bolt fasteners, and cap nuts, where grab bars are mounted on metal toilet partitions.

2.10 SHOWER CURTAIN RODS

- A. Stainless steel tubing, ASTM A569, minimum 1.27 mm (0.050 inch) wall thickness, 32 mm (1 1/4 inch) outside diameter.
- B. Flanges, stainless steel rings, 66 mm (2 5/8 inch) minimum outside diameter, with 2 holes opposite each other for 6 mm (1/4 inch) stainless steel fastening bolts. Provide a set screw within the curvature of each flange for securing the rod.
- C. Intermediate support for rods over 1800 mm (six feet) long. Provide adjustable ceiling flanges with set screws, tubular hangers and stirrups.

2.11 CLOTHES HOOKS

- A. Fabricate hook units either of chromium plated brass with a satin finish, or stainless steel, using 6 mm (1/4 inch) minimum thick stock, with edges and corners rounded smooth to the thickness of the metal, or 3 mm (1/8 inch) minimum radius.
- B. Fabricate each unit as a double hook on a single shaft, integral with or permanently fastened to the wall flange, provided with concealed fastenings.

2.12 TOWEL BARS

- A. Fed. Spec. WW-P-541/8B, Type IV, Bar, Surface mounted; Class 1, towel.
- B. Either stainless steel, or chromium plated copper alloy.
- C. Bar Length: 450 and 600 mm (18 and 24 inches) as shown.
- D. Finish of brackets or supports same as bar.

2.13 METAL FRAMED MIRRORS

- A. Fed. Spec. A-A-3002 metal frame; stainless steel, type 302 or 304.
- B. Mirror Glass:
 1. Laminated safety mirror glass.
 2. Set mirror in a protective vinyl glazing tape.
- C. Frames:
 1. Channel or angle shaped section with face of frame not less than 9 mm (3/8 inch) wide. Fabricate with square corners.
 2. Use 0.9 mm (0.0359 inch) thick stainless steel.

3. Filler:

- a. Where mirrors are mounted on walls having ceramic tile wainscots not flush with wall above, provide fillers at void between back of mirror and wall surface.
- b. Fabricate fillers from same material and finish as the mirror frame, contoured to conceal the void behind the mirror at sides and top.

D. Back Plate:

1. Fabricate backplate for concealed wall hanging of either zinc-coated, or cadmium plated 0.9 mm (0.036 inch) thick sheet steel, die cut to fit face of mirror frame, and furnish with theft resistant concealed wall fastenings.
2. Use set screw type theft resistant concealed fastening system for mounting mirrors.

E. Mounting Bracket:

1. Designed to support mirror tight to wall.
2. Designed to retain mirror with concealed set screw fastenings.

2.14 AUTOMATIC LAVATORY MOUNTED SOAP DISPENSER

- A. Provide starter kit.
- B. countertop mounted.
- C. Automatically dispense controlled amount of liquid soap or lotion.
- D. Battery operated.
- E. Spout cover to be bright polished chrome.
- F. Soap refill includes new supply tube and pump mechanism in each refill.
- G. Blinking LED light to show low soap level and low battery life.

2.15 SOAP DISHES

A. Class 2, Recessed:

1. One piece seamless shell and flange with provisions for concealed fasteners.
2. Fabricate from either chromium plated brass, or 0.8 mm (0.0329 inch) thick stainless steel.
3. Form surface of soap tray with raised ridges or patterned dimples to provide gripping surface for soap bar, or provide flush soap tray with a retaining lip. Plastic soap trays or tray inserts are not acceptable.

2.16 UTILITY SHELF

- A. Shelf shall be 1.2mm thick (18 gage) minimum stainless steel with 19mm (3/4 inch) returned edges.
- B. Provide mounting brackets fabricated from 1.5 mm thick (16 gage) minimum stainless steel, welded to shelf bottom.

C. Locate brackets meeting instructions and recommendations of manufacturer.

D. Finish: AMP 503 - No. 4.

2.17 MOP RACKS

A. Minimum 1.0M (40 inches) long with five holders.

B. Clamps:

1. Minimum of 1.3 mm (0.050-inch) thick stainless steel bracket retaining channel with a hard rubber serrated cam; pivot mounted to channel.

2. Clamps to hold handles from 13 mm (1/2-inch) minimum to 32 mm (1-1/4 inch) maximum diameter.

C. Support:

1. Minimum of 1 mm (0.0375 inch) thick stainless steel hat shape channel to hold clamps away from wall as shown.

2. Drill wall flange for 3 mm (1/8 inch) fasteners above and below clamp locations.

D. Secure clamps to support with oval head machine screws or rivets into continuous reinforcing back of clamps.

E. Finish on Stainless Steel: AMP 503-No. 4.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before starting work notify Contracting Officer's Technical Representative in writing of any conflicts detrimental to installation or operation of units.

B. Verify with the Contracting Officer's Technical Representative the exact location of accessories.

3.2 INSTALLATION

A. Set work accurately, in alignment and where shown. Items shall be plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Toggle bolt to steel anchorage plates in frame partitions or hollow masonry. Expansion bolt to concrete or solid masonry.

C. Install accessories in accordance with the manufacturer's printed instructions and ASTM F446.

D. Install accessories plumb and level and securely anchor to substrate.

E. Install accessories in a manner that will permit the accessory to function as designed and allow for servicing as required without hampering or hindering the performance of other devices.

- F. Position and install dispensers, and other devices in countertops, clear of drawers, permitting ample clearance below countertop between devices, and ready access for maintenance as needed.
- G. Align mirrors, dispensers and other accessories even and level, when installed in battery.
- H. Install accessories to prevent striking by other moving, items or interference with accessibility.

3.3 CLEANING

- A. After installation, clean as recommended by the manufacturer and protect from damage until completion of the project.

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SECTION 10 44 13
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section covers recessed fire extinguisher cabinets.

1.2 QUALITY ASSURANCE

- A. Product Qualification: Provide products indicated under same category from one source produced by one manufacturer.
- B. Coordination: Verify that fire protection cabinets are sized to accommodate type and capacity of extinguishers required.
- C. UL-Listed Products: Fire extinguishers shall be UL listed with UL listing mark for type, rating and classification of extinguisher are satisfactory.

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.
- C. Cabinets: For fire protection cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style and materials. Show location of knockouts for hose valves, if required for application.

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):
D4802-02.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet
- C. United States Department of Justice (USDOJ):
ADA.....Americans with Disabilities Act

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINET

- A. Recessed Cabinets: Fully recessed type with flat trim of size as required.

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 steel sheet 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.
- C. Exposed Trim: One piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face. Trim shall be of same metal and finish as door.

2.3 FINISH

- A. Finish interior of cabinet body with baked-on semigloss white enamel.
- B. Finish door and frame with baked-on semi-gloss white enamel standard of manufacturer.

PART 3 - EXECUTION

- A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.
- B. Install cabinet so that bottom of cabinet is 975 mm (39 inches) above finished floor.

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SECTION 10 51 13
METAL LOCKERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Metal lockers include, but are not limited to, following:
1. Double tier wardrobe lockers with each locker unit 375mm (15 inches) wide, 450mm (18 inches) deep and 1800mm (72 inches) high, and each compartment with a door 900mm (36 inches) high. Provide each locker with handle, latch and locking mechanism.
 2. Accessories.

1.2 RELATED WORK

- A. Wall support and reinforcement for lockers: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- B. Rough carpentry: Section 06 10 00, ROUGH CARPENTRY.

1.3 PERFORMANCE REQUIREMENTS

- A. Performance Requirements:
1. General: Work shall meet performance requirements indicated by Contract Documents, including requirements specified in this Paragraph and in other parts of this Section.
 2. Performance: Work shall meet most stringent requirements for design, dimensions, performance, details, construction, accessibility and installation required by codes and regulations of public authorities having jurisdiction over the Work including, but not limited to, ADA and ANSI A117.1 for accessibility and usability for physically handicapped people.

1.4 QUALITY ASSURANCE

- A. Single Responsibility: Work shall be performed by a single installer having undivided responsibility for providing complete work and for performance, quality and appearance of work.
- B. Product Qualifications: Provide each type of metal locker as a complete unit produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.

- A1 C. Installer Qualifications: Installer shall specialize in performing work of this Section and have documented experience in detailing and installation and maintenance of type and quality required for work. Installer shall be acceptable to manufacturer and trained in use of materials and equipment to be employed in work, and have successfully completed 5 projects minimum using similar system of similar extent and complexity within the past three (3) years. Installer shall be in business 5 years minimum under same name. Upon request, provide proof of qualifications.

1.5 SUBMITTALS

- A. Submit in accordance with: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Product Data: Submit product specifications, technical data, standard detail drawings and installation instructions of manufacturer for each product. Include published data, certified conformance report or certified laboratory test report of manufacturer substantiating each proposed product meets requirements of Contract Documents.
- C. Shop Drawings: Submit shop drawings for fabrication and installation of work, including associated components. Indicate layout arrangement, typical and special details, method of installation, fillers, trim, base and accessories. Include locker numbering sequence information.
- D. Samples: Submit samples, on squares of same metal to be used for fabrication of metal lockers, of each color and finish required for lockers. Samples will be reviewed only for color and texture.

1.6 PRODUCT HANDLING

- A. Delivery: Do not deliver metal lockers until space to receive lockers is enclosed and ready for locker installation.
- B. Protection: Protect metal lockers from damage during delivery, handling, storage and installation.

1.7 MAINTENANCE

- A. Instructions: Provide maintenance instructions for work. Include instructions for cleaning lockers, and for adjusting, repairing and replacing locker doors and latching mechanisms.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Steel Sheet: ASTM A653, zinc hot-dip coated steel sheet for doors and door frames. Steel shall be free from buckle, scale and surface imperfections.
- B. Fasteners: Cadmium or zinc coated or nickel plated steel. Exposed bolt heads shall be slotless type. Provide self-locking nuts or lock washers for nuts on moving parts, or otherwise prevent loosening of nuts.
- C. Equipment: Furnish hooks and hang rods of cadmium or zinc coated steel or cast aluminum.

2.2 FABRICATION - GENERAL

- A. Construction:
 - 1. Factory assemble metal lockers. Weld frame members together to form rigid, one-piece structure. Lockers shall be built on unit principle, each locker unit shall have an individual frame and door; individual top, bottom and back with common intermediate uprights separating compartments. Weld, bolt or rivet other joints and connections as standard with manufacturer. Grind exposed welds flush. Do not expose bolts or rivet heads on fronts of locker doors or frames.
 - 2. Fabricate metal lockers square, rigid and without warp, with metal faces flat and free of dents and distortion. Make exposed metal edges safe to touch.
- B. Frames: Fabricate with channels 1.5mm (0.0598 inch) minimum base steel thickness, or angles 2.5mm (0.1046 inch) minimum base steel thickness, with continuous stop/strike formed on vertical members.
- C. Finishing: Chemically pretreat metal with degreasing and phosphatizing process. Provide thermal cured finish coating system for exposed and concealed metal surfaces of lockers and associated components, except number plates and non-ferrous metal. Finish coating shall have dry film thickness of 1.0 mils minimum.

2.3 WARDROBE LOCKERS

A. Body:

1. Solid Sides: Fabricate back and sides with sheet steel of 0.6mm (0.0239 inch) minimum base steel thickness and double flanged connections extending full height. Form top and bottom sheet steel of 0.6mm (0.0239 inch) minimum base steel thickness and flanged edges.
2. Exposed Ends: Form exposed ends of non-recessed lockers with sheet steel of 1.5mm (0.0598 inch) minimum base steel thickness.

B. Door:

1. Type - Sheet Steel: One piece, sheet steel of 1.5mm (0.0598 inch) minimum base steel thickness, flanged at edges, constructed to prevent springing when opening or closing. Fabricate to swing 180 degrees.
2. Reinforcing: Provide extra bracing or reinforcing on inside of doors over 375mm (15 inches) wide.
3. Ventilation - Louvers: Provide stamped, louvered vents in door face, as follows:
 - b. Double Tier Lockers: Three minimum louver openings top and bottom.
4. Hinges:
 - a. General: Heavy duty, 1.3mm (0.050 inch) minimum thickness steel, full loop, five knuckle minimum, tight pin, 50mm (2 inches) high. Weld to inside of frame and secure to door with not less than two factory installed fasteners which are completely concealed and tamperproof when door is closed.
 - b. Quantity: Provide 3 hinges minimum for each door more than 1050mm (42 inches) high and 2 hinges minimum for each door of another height.

C. Handle and Latching:

1. Projecting Handle and Latch:
 - a. General: Lift-up action handle with chromium plated finish. Latching shall be heavy duty, positive automatic, prelocking, vandal proof and pry resistant mechanism with staple and eye for padlock, and with required latching action, except as otherwise required. Provide synthetic rubber silencers secured in frame at each latch point.

- b. Double Tier Lockers: Two point minimum latching for each door.
- 2. Accessible Handle and Latch:
 - a. General: Provide ADA designated locker units with ADA compliant lever handle with chromium plated finish or recessed housing of one-piece stainless steel with polished finish for latch and locking assembly, standard of manufacturer. Latching shall have ADA compliant action and activation not requiring tight grasping, pinching, or twisting of the wrist and that operates with maximum 5 pound force; shall be heavy duty, positive automatic, prelocking vandal proof and pry resistant mechanism with staple and eye for padlock or provisions for built-in lock, and with latching as required. Provide synthetic rubber silencers secured in frame at each latch point.
 - b. Double Tier Lockers: Two point minimum latching for each door.

D. Locking:

- 1. Padlock: Provide handle and latch mechanism with staple and eye for padlock.

E. Accessible Lockers: Lockers shall meet applicable requirements of this Section, except lockers shall be configured for disabled people meeting applicable requirements indicated by Contract Documents. Accessible configuration shall include:

- 1. General: Lower opening of a double tier locker.
- 2. Bottom: Locker bottom shall be 375mm (15 inches) minimum off floor or an extra shelf provided 375mm (15 inches) minimum off floor for forward reach units and 375mm (15 inches) minimum off floor for parallel reach units.
- 3. Handle: ADA compliant handle and latch, as specified in Paragraph - Handle and Latching, of this Article..
- 4. Symbol: Lockers indicated for disabled people shall have accessibility symbol affixed to door.

F. Color: As selected by Architect from standard colors of manufacturer.

2.4 ACCESSORIES

A. Hooks: Furnish each locker with following:

- 1. Double Tier Units: One double prong ceiling hook and 2 minimum single prong wall hooks.

- B. Number Plates: Provide etched, embossed or stamped, non-ferrous metal number plates with numerals of 10mm (3/8 inch) minimum height. Number lockers in sequence as directed by Architect. Attach plates to each locker door, near top, centered, with at least two fasteners of same finish as number plate.
- C. Legs - Normal: Provide 150mm (6 inch) high legs by extending vertical frame members or by attaching gusset type legs fabricated of sheet steel of 1.5mm (0.0598 inch) minimum base steel thickness, with provision for fastening to floor.
- D. Metal Base - Closed: Provide sheet steel of 0.9mm (0.0359 inch) minimum base steel thickness, fabricated to enclose base of lockers between legs of locker. Flange ends inward 19mm (3/4 inch) minimum for stiffening.
- E. Sloping Tops - Continuous: Provide sheet steel of 0.9mm (0.0359 inch) minimum base steel thickness, at approximately 25 degrees pitch, in as long lengths as practicable, but length of 4 lockers minimum. Provide closures at ends.
- F. Filler Panels: Provide filler panels as required for closure to adjacent construction or surfaces or other like conditions, factory fabricated, of steel sheet of 0.9mm (0.0359 inch) minimum base steel thickness, with concealed fasteners.
- G. Recess Trim: Provide trim fabricated from sheet steel of 0.0428 inch minimum base steel thickness, for closing spaces at top and ends of recessed lockers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine areas and conditions under which work is to be installed for compliance with requirements of Contract Documents and to determine if conditions affecting performance of work are satisfactory. Do not proceed with installation until unsatisfactory conditions have been resolved. Commencement of installation shall constitute acceptance of conditions.

3.2 INSTALLATION

- A. General: Install work meeting requirements of Contract Documents, as indicated by final reviewed submittals for work and meeting instructions and recommendations of product manufacturers.

- B. Locker Anchorage: Anchor lockers to supporting construction at 900mm (36 inches) maximum centers, except as otherwise instructed and recommended by manufacturer. Install anchors through back-up reinforcing plates where necessary to avoid metal distortion. Conceal fasteners wherever possible.
- C. Accessories: Install metal bases, sloping tops and other accessories to provide a flush, hairline joint against adjacent surfaces. Install with concealed fasteners.

3.3 ADJUSTING AND CLEANING

- A. Adjustment: Adjust doors and latches to operate easily without binding. Verify integral locking devices are operating properly.
- B. Touch-Up: Touch-up marred finishes or replace units with marred finish which cannot be restored to factory finished appearance. Use only materials and finishes recommended or furnished by metal locker manufacturer.
- C. Cleaning: Clean interior and exposed surfaces free of debris, stains and dust.

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SECTION 11 44 00
FOOD COOKING EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies food service cooking equipment as follows:
1. Refrigerator/freezer.
 2. Consumer microwave oven.
 3. Coffee brewer, electric.

1.2 RELATED WORK

- A. Plumbing Connections: Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING, Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING , Section 22 11 00, FACILITY WATER DISTRIBUTION, Section 22 13 00, FACILITY SANITARY SEWERAGE, .
- B. Electrical Connections: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- C. Electrical Disconnect Switches: Section 26 29 21, DISCONNECT SWITCHES.

1.3 QUALITY CONTROL

- A. Installer Qualifications:
1. Where required to complete equipment installation, electrician and plumber shall be licensed in jurisdiction where project is located.
- B. NSF Compliance: Equipment bears NSF Certification Mark or UL Classification Mark indicating compliance with NSF/ANSI 4E.
- C. UL Listing: Equipment is listed in UL "Heating, Cooling, Ventilating and Cooking Equipment Directory" and is labeled for intended use.
1. Electric Cooking Equipment: Evaluated according to UL 197.
- D. In-Use Service: At least one factory-authorized service agency for equipment shall be located in the geographical area of the installation and shall have the ability to provide service within 24 hours after receiving a service call.

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. Include manufacturer's address and telephone number.
 2. Include catalog or model numbers and illustrations and descriptions of cooking equipment.

- ## 1.5 WARRANTY

- ## 1.6 APPLICABLE PUBLICATIONS

- ## PART 2 - PRODUCTS

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B. Refrigerator/Freezer Unit:

SYMBOL	CAPACITY
K7250	20 Cubic Feet

C. Acceptable Products:

1. General Electric Company, GE Profile Counter-Depth 24.6 Cu. Ft. Side-by-Side Refrigerator, or equal, as acceptable to Owner and Architect.

2.2 MICROWAVE OVEN - CONSUMER

A. General Requirements: Counter mounted consumer grade microwave oven for average duty use, as follows:

1. Touch pad controls.
2. Digital timer.
3. Power level selector.
4. Preprogrammed selectors for commonly cooked items.
5. Finish: Stainless steel.

B. Microwave Oven:

SYMBOL	MOUNTING
K4665	Counter

C. Acceptable Products:

1. KitchenAid, KCMS1555RWH, or equal, as acceptable to Owner and Architect.

2.3 SEMI-AUTOMATIC COFFEE BREWER - ELECTRIC

A. General Requirements: Semi-automatic coffee brewer for coffee brewing in cafeterias and commercial institutions as follows:

1. Units shall include heating tank, connection for cold water supply, decanter service, funnel and a hot water flow controller.
2. Unit shall automatically shut off water flow when enough liquid has passed to fill decanter.
3. Provide plumbed with separate hot water faucet.
4. Provide removable dispenser carafes for each burner. Provide stainless steel, insulated carafe for single burner unit.
5. Finish: Stainless steel.

B. Coffee Brewer Units:

SYMBOL	TOP COMPONENT
K1552	2 Burner
K1550B	1 Burner

C. Acceptable Products:

1. Three Burner Unit - Front/Back:

- a. Bunn-O-Matic Corp., Axiom P-3-DV, #38700-0023, or equal, as acceptable to Owner and Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cooking equipment level and plumb; arranged for safe and convenient operation; with access clearances required for maintenance and cleaning; and according to manufacturer's written instructions.
- B. Interconnect cooking equipment to service utilities.

3.2 CLEAN-UP

- A. At completion of the installation, clean and adjust cooking equipment as required to produce ready-for-use condition.
- B. Where stainless-steel surfaces are damaged during installation procedures, repair finishes to match adjoining undamaged surfaces.

3.3 INSTRUCTIONS

- A. Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

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SECTION 12 24 00
WINDOW SHADES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Included: Window shades include, but are not limited to, following:
1. Manual roller screen window shades.
 2. All brackets, fittings and hardware required for a complete installation.

1.2 RELATED WORK

- A. Motorized Shades: Section 12 24 19, MOTORIZED SHADES for motorized window shades and motorized room darkening shades.

1.3 QUALITY CONTROL

- A. Manufacturer's Qualification: Shade manufacturer shall provide evidence that the manufacture of shades are a major product, and that the shades have performed satisfactorily on similar installations.

1.4 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Provide shades identical to those tested for following fire performance characteristics as determined by testing identical products, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction over the Work.
1. Flame Spread and Smoke Developed Ratings: ASTM E84, flame spread of 25 maximum and smoke developed of 200 maximum.
 2. NFPA Compliance: NFPA 701 - Vertical Burn Test, Small Scale, rated Pass.
 3. Federal Specifications: Shade cloth shall conform to fire resistant requirement of Fed. Spec. A-A-59517.
- C. Microbial Resistance: No growth for fungi ATCC9642, ATCC9644 or ATCC9645 when evaluated meeting requirements of ASTM G21.
- D. Tolerances:
1. Maximum Variation of Gap at Window Opening Perimeter: 1/8 inch, per 8 feet of shade height, non-cumulative.
 2. Maximum Offset from Level: 1/8 inch.
 3. Edge Clearance for Shades Where Width-to-Height Ratio Exceeds 1 to 3: Specification of manufacturer.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers' Literature and Data: Showing details of construction and hardware for window shades.

- C. Shop Drawings: Submit shop drawings for fabrication and installation of work, including associated appurtenances. Indicate location and extent of each type shade. Include elevations indicating each shade unit. Indicate installation details, dimensions and relationship to adjoining work. Indicate project site recorded measurements.
 - 1. Window Treatment Schedule: For all shades, use same room designations as indicated on Drawings and include opening sizes and key to typical mounting details.
- D. Samples: Submit representative samples, approximately 24 inches square, of each type product for each pattern, texture and color required, including chain and ring. Samples will be reviewed for visual characteristics, including type, pattern, texture and color.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Insofar as possible, check actual locations of construction to which work must fit, by accurate field measurements before preparation of shop drawings and fabrication. Verify work can be installed in compliance with requirements of Contract Documents. Show recorded measurements on shop drawings. Allow for adjustments wherever taking field measurements before fabrication might delay installation schedule.
- B. Environmental Conditions: Install shades only when ambient temperature and humidity have reached and are maintained at designed levels.
- C. Sequencing: Finishing and cleaning operations shall be complete in each space where shades are to be installed, before beginning installation.

1.5 OPERATION AND MAINTENANCE

- A. Data: Provide bound operating and maintenance data of manufacturer for work. Include instructions for operation, adjustments and maintenance, and maintenance recommendations and replaceable parts lists. Include instructions for general maintenance, including cleaning and repair, and product data of manufacturer for each product. Also, include recommended cleaning agents.
- B. Instructions: Instruct maintenance personnel of Owner in proper use, operation and maintenance of shade system. Train personnel in normal procedures to be followed in checking for source of operational failure and malfunction.

1.6 WARRANTY

- A. Warranty: Conform to terms of "Warranty of Construction", FAR clause 52.246-21, except extend warranty period for the following:
 - 1. Shade Hardware and Shade Cloth: 10 years.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by the basic designation only.
- B. American National Standards Institute (ANSI):
 - A117.1.....Accessible and Useable Buildings and Facilities
- C. Federal Specifications (Fed. Spec.):
 - AA-V-00200B.....Venetian Blinds, Shade, Roller, Window, Roller, Slat, Cord, and Accessories
 - A-A-59517.....Cloth, Coated or Laminated, Polyvinylchloride (Artificial Leather)
- D. American Society for Testing and Materials (ASTM):
 - A167-99 (R2004).....Stainless and heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
 - B221/B221M-07.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - D635-06.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
 - D648-07.....Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
 - D1784 Rev.A-06.....Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- D. National Fire Protection Association (NFPA):
 - NFPA 101.....Life Safety Code
 - NFPA 701.....Fire Tests for Flame-Resistant Textiles and Films

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Hunter Douglas, or equal, as acceptable to Owner and Architect.
- B. MechoShade Systems, Inc., or equal, as acceptable to Owner and Architect.

2.2 MATERIALS

- A. Shade Cloth Fabric - Translucent:
 - 1. Description: TPO fabric, translucent, single thickness, non-raveling, 5 percent openness factor. Products containing PVC are not allowed.

2. Acceptable Products:

- a. MechoShade Systems, Inc., EcoVeil 1350, or equal, as acceptable to Owner and Architect.
- B. Stainless Steel: ASTM A167
- C. Extruded Aluminum: ASTM B221/B221M.
- D. Plastic Components: MIL M-24519, glass reinforced polyester thermo-polymer plastic.
- E. Control System: Adjustment-free continuous #10 stainless steel ball chain (90 lb. test) and pulley clutch operating system with 0.5 pound maximum drag.
- F. Roller: Extruded aluminum tube, painted, of diameter and thickness as recommended by manufacturer for span and support of shade system.
- G. End Ply: Plastic outside sleeve and center shaft bearing surface for roller.
- H. Bottom Rod: Extruded aluminum weight in sealed pocket hem bar.

2.3 ROLLER SHADE

- A. Manually Operated Shade:
 - 1. Shade Cloth - Translucent:
 - a. Fabric: Translucent, linear weave pattern, 5 percent open.
 - b. Color: As selected by Architect from standard colors of manufacturer.
 - 3. Mounting: Surface mounted with fascia.
 - 4. Configuration: Single or double roll shade configuration as indicated on Drawings.

2.4 FASTENINGS

- A. Zinc-coated or stainless steel fastenings of proper length and type meeting instructions and recommendations of manufacturer. Except as otherwise specified, fastenings for use with various structural materials shall be as follows:

Type of Fastening	Structural Material
Wood screw	Wood
Tap screw	Metal
Case-hardened, self-tapping screw	Sheet Metal
Screw or bolt in expansion shields	Solid masonry
Toggle bolts	Hollow blocks, wallboard and plaster

2.5 FABRICATION

- A. Fabricate shades to fit measurements of finished openings obtained at site. Measurements tolerance shall be $\pm 1/8$ inch unless otherwise required by shade manufacturer.
- B. Window Shades: Rolling type, constructed of shade cloth mounted on rollers. Shade cloth shall have plain sides, and sealed hem-bar. Separate shades are required for each individual sash within opening. Length of shades shall exceed height of window approximately 300 mm (12 inches) measured from head to sill, in addition to material required to make-up hem:
 - 1. Provide rollers with spindles, nylon bearings, tempered steel springs, and all other related accessories required for positive action. Provide rollers of diameter recommended by shade manufacturer.
 - 2. Provide bottom rod with weight in a sealed pocket hem bar for tracking adjustments, to prevent wrinkling or folding and to keep shade plumb with axis of rollers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mounting:
 - 1. Install shade units level, plumb and true to line.
 - 2. Mount shade units with shade cloth 2 inches minimum from face of glass.
 - 3. Securely anchor shade units in place with hardware and accessories to provide smooth operation without binding.
- B. Window Shades: Mount window shades on end of face brackets, set on metal gussets, or casing of windows as required. Provide extension face brackets where necessary at mullions.
 - 1. Locate rollers in level position as high as practicable at heads of windows to prevent infiltration of light over rollers.
 - 2. Where extension brackets are necessary, on mullions or elsewhere, for alignment of shades, provide metal lugs, and rigidly anchor lugs and brackets.
 - 3. Place brackets and rollers so that shades will not interfere with window and screen hardware.
 - 4. Shade installation methods not specifically described, are subject to approval of Contracting Officer's Technical Representative.

3.2 ADJUSTING AND CLEANING

- A. Adjusting: Adjust units for smooth operation. Adjust shade and shade cloth to hang flat without buckling or distortion. Replace any units or components which do not hang properly or operate smoothly.
- B. Touch-Up: Touch-up damaged finishes and repair minor damage in order to eliminate evidence of repair. Remove and replace work that cannot be satisfactorily repaired as determined by Architect.
- C. Cleaning: After completing installation, clean shade surfaces meeting instructions of manufacturer. Remove and replace work that cannot be satisfactory cleaned as determined by Architect.

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SECTION 12 24 19
MOTORIZED SHADES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Included: Lightproof shades include, but are not limited to, following:
1. Interior, motorized roller screen window shades.
 2. Interior, motorized roller screen room darkening shades.
 3. All brackets, fittings and hardware required for a complete installation.
 4. Controls, components, accessories and coordination required for interfacing with lighting controls and audio visual systems.

1.2 RELATED WORK

- A. Manual Shades: Section 12 24 00, WINDOW SHADES.
- B. Electrical: Electrical power source, power and control wiring and final connections to electrical shade components.
- C. Lighting and Audiovisual Controls: Lighting controls and audio visual wiring and final connection to shade components.

1.3 QUALITY CONTROL

- A. Manufacturer's Qualification: Shade manufacturer shall provide evidence that the manufacture of shades are a major product, and that the shades have performed satisfactorily on similar installations.

1.4 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Provide shades identical to those tested for following fire performance characteristics as determined by testing identical products, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction over the Work.
1. Flame Spread and Smoke Developed Ratings: ASTM E84, flame spread of 25 maximum and smoke developed of 200 maximum.
 2. NFPA Compliance: NFPA 701 - Vertical Burn Test, Small Scale, rated Pass.
 3. Federal Specifications: Shade cloth shall conform to fire resistant requirement of Fed. Spec. A-A-59517.
- B. Electrical Components: Electrical components shall be listed meeting requirements of NFPA Article 100 and shall be labeled by UL or other testing agency acceptable to public authorities having jurisdiction over the Work.
- C. Microbial Resistance: No growth for fungi ATCC9642, ATCC9644 or ATCC9645 when evaluated meeting requirements of ASTM G21.

D. Tolerances:

1. Maximum Variation of Gap at Window Opening Perimeter: 1/8 inch, per 8 feet of shade height, non-cumulative.
2. Maximum Offset from Level: 1/8 inch.
3. Edge Clearance for Shades Where Width-to-Height Ratio Exceeds 1 to 3: Specification of manufacturer.

1.3 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
- B. Manufacturers' Literature and Data: Showing details of construction and hardware for room darkening shades.
- C. Shop Drawings: Submit shop drawings for fabrication and installation of work, including associated appurtenances. Indicate location and extent of each type shade. Include elevations indicating each shade unit and location of controls. Indicate installation details, dimensions and relationship to adjoining work. Indicate project site recorded measurements.
 1. Window Treatment Schedule: For all shades, use same room designations as indicated on Drawings and include opening sizes and key to typical mounting details.
 2. Wiring Diagrams: Include detailed wire diagrams and schematics of motor operated shade systems, and each component of systems with detailed list of components, using schematics and operational characteristics.
- D. Samples: Submit representative samples, approximately 24 inches square, of each type product for each pattern, texture and color required. Samples will be reviewed for visual characteristics, including type, pattern, texture and color.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Insofar as possible, check actual locations of construction to which work must fit, by accurate field measurements before preparation of shop drawings and fabrication. Verify work can be installed in compliance with requirements of Contract Documents. Show recorded measurements on shop drawings. Allow for adjustments wherever taking field measurements before fabrication might delay installation schedule.
- B. Environmental Conditions: Install shades only when ambient temperature and humidity have reached and are maintained at designed levels.
- C. Sequencing: Finishing and cleaning operations shall be complete in each space where shades are to be installed, before beginning installation.

1.5 OPERATION AND MAINTENANCE

- A. Data: Provide bound operating and maintenance data of manufacturer for work. Include instructions for operation, adjustments and maintenance, and maintenance recommendations and replaceable parts lists. Include instructions for general maintenance, including cleaning and repair, and product data of manufacturer for each product. Also, include recommended cleaning agents.
- B. Instructions: Instruct maintenance personnel of Owner in proper use, operation and maintenance of shade system. Train personnel in normal procedures to be followed in checking for source of operational failure and malfunction.

1.6 WARRANTY

- A. Warranty: Conform to terms of "Warranty of Construction", FAR clause 52.246-21, except extend warranty period for the following:
 - 1. Shade Hardware and Shade Cloth: 10 years.
 - 2. Motors and Motor Control Systems: 5 years.

1.7 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute (ANSI):
 - All7.1.....Accessible and Useable Buildings and Facilities
- C. Federal Specifications (Fed. Spec.):
 - A-A-59517.....Cloth, Coated or Laminated, Polyvinylchloride
(Artificial Leather)
- D. National Fire Protection Association (NFPA):
 - NFPA 101.....Life Safety Code
 - NFPA 701.....Fire Tests for Flame-Resistant Textiles and
Films

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Hunter Douglas.
- B. MechoShade Systems, Inc.
- C. Equal, as acceptable to Owner and Architect.

2.2 SHADE CLOTH

- A. Shade Cloth - Translucent:
 - 1. Description: TPO fabric, translucent, single thickness, non-raveling, 5 percent openness factor. Products containing PVC are not allowed.

2. Color: As selected by Architect from standard of manufacturer.
3. Acceptable Products:
 - a. MechoShade Systems, Inc., EcoVeil 1350, or equal, as acceptable to Owner and Architect.

B. Shade Cloth - Room Darkening:

1. Description: Room darkening shade cloth fabric with opaque acrylic backing, 0 percent openness factor. Products containing PVC are not allowed.
2. Color: As selected by Architect from standard of manufacturer.

2.3 COMPONENTS

A. General:

1. Provide shade hardware allowing removal of shade roller tube from brackets without removal of hardware from opening and without requiring end or center supports to be removed.
2. Provide shade hardware allowing removal of and re-mounting of shade bands without removal of shade tube, drive or operating support brackets.
3. Styrene based plastics, polyester or reinforced polyester plastics are not acceptable.

B. Mounting:

1. Shades may be single or double roller mounted, as indicated on Drawings.
2. Roller Configuration: Roller mounting configuration shall be as indicated on Drawings.

C. Shade Band: Fabric, enclosed hem weight, shade roller tube and attachment of shade band to roller tube. Sewn hems and open hem pockets are not acceptable.

1. Concealed Hembar: Continuous, extruded aluminum bar extending entire width of shade band, heat sealed on all sides. Open ends are not acceptable.
2. Shade Band and Roller Attachment:
 - a. Provide extruded aluminum shade roller tube of diameter and wall thickness as required to support shade fabric without excessive deflection.
 - b. Provide for positive mechanical attachment of shade band to roller tube. Shade bands shall be made removable and replaceable with a snap-on spline type mounting that does not require removal of shade roller from shade brackets.
 - c. Mounting spline shall not require use of adhesives, tapes, staples or rivets.

C. Motorized Shade Hardware and Shade Brackets:

1. Construction: Plated steel, 1/8 inch thick minimum, but of thickness required to support 150 percent of full weight of each shade. Plastic components without use of steel reinforcement are not acceptable.
2. Field Adjustment: Hardware system shall allow for field adjustment of motor without removal or replacement of any operable hardware components.
3. Alignment: Shade bands within single motor group shall be aligned within 1/4 inch.

2.4 MOTOR DRIVE SYSTEM

A. Shade Motors:

1. Tubular, asynchronous motors, with built-in reversible capacitor operating at 110 VAC, 60 hz, single phase, temperature Class A, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each motor.
2. Motor shall be concealed inside shade roller tube.
3. Maximum Current Draw: 1.8 amps.
4. Use motors rated at same nominal speed for all shades in same room.

B. Weight: Hanging weight of shade band shall be 80 percent maximum of rated lifting capacity of shade motor and tube assembly.

C. Motor System: Meet following requirements:

1. Operation Noise: Quiet operation up to 44 dBa within 3 feet, open air.
2. Stopping Points: Upper and lower stopping points of shadeband shall be programmed into motors with hand held removable program module.
3. Intermediate Stopping Points: Intermediate stopping positions for shades shall allow 3 minimum repeatable and precise aligned positions.
4. Alignment Points: Provide 103 minimum available alignment points including 3 user programmable predefined intermediate positions. Shades on same switch circuit with same opening height shall align at each intermediate stopping position.
5. Control Method: Astronomical timers.
6. Modes of Operation: Provide for following modes of operation:
 - a. Uniform Mode: Shades only move to intermediate stop positions.
 - b. Regular Mode: Shade move to both intermediate stop positions, as well as any position desired between upper and lower limits as set by installer.

7. Wall Switches: 5 or 10 button, single gang, low voltage.

2.05 ACCESSORIES

- A. Fascia: Continuous removable extruded aluminum fascia panel that attaches to shade mounting brackets without use of adhesives, magnetic strips or exposed fasteners, for full concealment of brackets, shade roller and fabric on tube.
- B. Room Darkening Side and Sill Channels:
 - 1. Channels: Extruded aluminum channels with concealed fastenings, with light seals, sized and shaped to accept hembar and prevent light gaps and infiltration of outdoor light.
 - 2. Color: As selected by Architect from standard of manufacturer.
- C. Endcap Covers: Provide extruded aluminum covers to fully cover exposed endcaps.
- D. Fasteners: Zinc-coated or stainless steel fastenings standard of manufacturer, corrosion resistant of proper length and appropriate for type substrate and support material.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Install lightproof shades level at a height that will permit proper operation of the shades, and prevent outside light from infiltrating into the room. Light traps shall be closely fitted to the adjacent construction, and the connection shall be rigid and light-tight.
 - 2. Place brackets and rollers so that shades will not interfere with window and screen hardware.
 - 3. Shade installation methods not specifically described, are subject to approval of Contracting Officer's Technical Representative.
- B. Mounting:
 - 1. Install shade units level, plumb and true to line.
 - 2. Mount shade units with shade cloth 2 inches minimum from face of glass.
 - 3. Securely anchor shade units in place with hardware and accessories to provide smooth operation without binding.

3.2 ADJUSTING AND CLEANING

- A. Adjusting: Adjust units for smooth operation. Adjust shade and shade cloth to hang flat without buckling or distortion. Replace any units or components which do not hang properly or operate smoothly.

- B. Touch-Up: Touch-up damaged finishes and repair minor damage in order to eliminate evidence of repair. Remove and replace work that cannot be satisfactorily repaired as determined by Architect.
- C. Cleaning: After completing installation, clean shade surfaces meeting instructions of manufacturer. Remove and replace work that cannot be satisfactory cleaned as determined by Architect.

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**SECTION 12 36 00
COUNTERTOPS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies casework quartz solid surface countertops.
- B. Schedule: Required types and applications of countertops include, but are not limited to, materials and application locations specified in Article - Countertop Schedule at the end of this Section.

1.2 RELATED WORK

- A. Countertops to be provided as part of single responsibility work as specified in Section 06 20 00, FINISH CARPENTRY.
- B. DIVISION 22, PLUMBING.

1.3 SUBMITTALS

- A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings
 - 1. Show dimensions of section and method of assembly.
 - 2. Show details of construction at 1:25 (1/2) scale.
- C. Samples:
 - 1. 150 mm (6 inch) square samples each top.
 - 2. Front edge, back splash, end splash and core with surface material and booking.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American National Standards (ANSI):
 - A117.1.....Accessible and Useable Buildings and Facilities
- C. Architectural Woodwork Institute (AWI): Quality Standards, for cast plastic fabrications.
- D. International Solid Surface Fabricators Association (ISSFA):
 - 2-01.....Classification and Standards Publication of
Solid Surfacing Material
- E. National Fire Protection Association (NFPA):
 - 101.....Life Safety Code (Code for Safety to Life from
Fire in Buildings and Structures)
- F. United States Department of Justice (USDOJ):
 - ADA.....Americans with Disabilities Act

PART 2 - PRODUCTS**2.1 MATERIALS****A. Quartz Solid Surfacing:**

1. Solid, non-porous, homogeneous blend of crushed quartz aggregate, resin and pigments fabricated into flat slabs. Quartz solid surfacing shall be anti-microbial, and color and pattern shall extend throughout thickness of material.
2. Performance properties required:

Property	Result	Test
Compressive Strength	10,430 psi (dry) minimum 11,260 psi (wet) minimum	ASTM C170
Bond Strength	205 psi minimum	ASTM C482
Modules of Rupture	2,110 psi minimum	ASTM C99
Surface Burning	Flame spread 25 maximum Smoke developed 255 maximum	ASTM E84
Hardness	7 minimum	Mohs hardness scale
Abrasion Resistance	223 maximum	ASTM C501
Thermal Shock Resistance	Passes 5 cycles	ASTM C484
Stain and Acid Resistance	Passes	ANSI 2124.6 and ASTM D2299.
Fungi and Bacteria Resistance	Passes	ASTM G21 and ASTM G22

3. Color: As indicated in Article - Countertop Schedule of this Section.
4. Edge Treatment: As indicated on Drawings.
5. Acceptable Products:
 - a. Cambria, Classic Collection, or equal as acceptable to Owner and Architect.

2.2 FABRICATION - GENERAL

- A. General: Fabricate work to meet requirements of Contract Documents as indicated by final reviewed submittals for the work, and instructions and recommendations of product manufacturers.
- B. Size and Thickness: Use materials of size and thickness required. If not indicated by Contract Documents, select size and thickness to provide strength and durability in finished work for intended application. Work to required dimensions, using proven fabrication details.

C. Coordination:

1. General: Coordinate fabrication with adjacent construction. Correct any errors, omissions or inconsistencies before proceeding.
2. Related Components: Provide holes and cutouts to receive plumbing fixtures, accessories and related components or for penetrations. Cut, drill and tap work to receive fasteners, hardware and like components.

D. Exposed Work:

1. General: Carefully match exposed work to produce continuity of design and line, and accurate relation of planes, angles and curves.
2. Surfaces: Select materials for flatness, smoothness and freedom from surface blemishes forming marks, roughness and like conditions. Imperfections will not be acceptable.
3. Sizes: Materials shall be one-piece units of required dimensions for application.
4. Forming: Form materials and fabrications using a template type device as applicable.
5. Joints: Joints in work shall be accurately fitted and rigidly secured with inconspicuous hairline contacts without voids using adhesive as recommended by manufacturing. When required, provide chemical or heat welded joints which are true and flush with parent material surfaces.
6. Edge Finish: Rout and finish edges to smooth, uniform appearance and finish. Remove arrises from cut edges, and ease exterior corner edges to radius of 0.5mm (1/64 inch).

E. Reinforcement: Reinforce work as required to meet performance requirements and for anchoring work to supporting construction. Reinforcement shall be concealed in the complete work.

F. Assembly Methods:

1. General: Except as otherwise required, methods of assembly and joining shall be proven methods optional with manufacturer. Methods shall produce workmanship and finished items acceptable to Architect.
2. Fasteners: Conceal fasteners wherever possible.
3. Distortion and Overstress: Fabricate and fasten work so that the work will not be distorted nor the work or fasteners overstressed from the expansion, contraction and other movement of the work.

G. Finish: Exposed and semi-exposed surfaces in completed work shall be smooth and of uniform finish and appearance.

2.3 QUARTZ SOLID SURFACING

- A. General: Countertop units shall be of size, profile and details as required by Contract Documents. Provide 100mm (4 inch) high backsplash and sidesplash as applicable, except as otherwise required by Contract Documents.
- B. Standard and Grade: Meet applicable requirements of AWI - Quality Standards, Premium Grade.
- C. Materials: Fabricate countertops of quartz solid surfacing of following thickness:
 - 1. Horizontal Surfaces: As indicated on Drawings, but 28mm (1-1/8 inch) minimum thickness.
 - 2. Vertical Surfaces: As indicated on Drawings, but 19mm (3/4 inch) minimum thickness.
- D. Reinforcement: Provide quartz solid surfacing reinforcement strips at horizontal seams, corners, cutouts where remaining material is less than 3 inches and where additional reinforcement and thickness is required to prevent cracking, meeting instructions and recommendations of manufacturer.
- E. Fittings and Anchorages: Provide fittings and anchorages as required for installation and coordination with adjacent work.
- F. Drill or cutout for sinks, and penetrations. Accurately cut for size of penetration.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Before installing countertops verify that wall surfaces have been finished as specified and that plumbing service locations are as required.
- B. General: Install work meeting requirements of Contract Documents, as indicated by final reviewed submittals for work, and meeting instructions and recommendations of product manufacturers. Consult with manufacturers for conditions not covered by printed instructions.
- C. Standard and Grade: Meet requirements of AWI Quality Standards, Section 1700 - Installation of Woodwork as applicable, for respective plastic fabrication item of work and quality grade.
- D. Modifications: Perform modifications to and provide appurtenances necessary for proper fit and interface with adjoining components.

E. Methods:

1. See respective specification sections for work in which accessories are to be embedded or built-in, including requirements for any additional reinforcement required.
2. Scribe and cut components to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts. Do not cut or trim components in any manner which would damage finish, decrease strength, or result in a visual imperfection or a failure in performance of plastic fabrication unit.
3. Install work accurately to location, level and plumb; free of twist, rack and movement, and with neatly fitted joints and intersections. Shim as required using concealed shims. Anchor components in-place providing permanent support and installation.

F. Finished Surfaces: Entire surfaces of plastic fabrications shall be uniform, smooth, straight, and free from buckles, waves or projecting edges.

3.2 PROTECTION AND CLEANING

- A. Tightly cover and protect against dirt, water, and chemical or mechanical injury.
- B. Clean at completion of work.

3.3 COUNTERTOP SCHEDULE

- A. Countertop S-1:
 1. Type: Quartz solid surfacing.
 2. Manufacturer: Cambria, Classic Collection, or equal, as acceptable to Owner and Architect.
 3. Color: Tenby Cream 0510.

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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. 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: Glazing; nonbearing partitions; suspended ceilings; cabinets; bookshelves; and storage racks.
 - 2. Electrical Elements: Power and lighting systems; fire protection and alarm systems; special life support systems; and telephone and communication systems.
 - 3. Mechanical Elements: Heating, ventilating, and air-conditioning systems; plumbing systems; 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 Contracting Officer's Technical Representative.
 - 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 plane.
 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):
 355.2-07.....Qualification 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. American Society for Testing and Materials (ASTM):
 A36/A36M-05.....Standard Specification for Carbon Structural
 Steel.
 A53/A53M-07.....Standard Specification for Pipe, Steel, Black
 and Hot-Dipped, Zinc-Coated, Welded and
 Seamless.
 A307 (REV A-07).....Standard Specification for Carbon Steel Bolts
 and Studs; 60,000 PSI Tensile Strength.
 A325-07.....Standard Specification for Structural Bolts,
 Steel, Heat Treated, 120/105 ksi Minimum Tensile
 Strength.
 A325M-05.....Standard Specification for High-Strength Bolts
 for Structural Steel Joints [Metric].
 A490-06.....Standard Specification for Heat-Treated Steel
 Structural Bolts, 150 ksi Minimum Tensile
 Strength.
 A490M (REV A-04).....Standard Specification for High-Strength Steel
 Bolts, Classes 10.9 and 10.9.3, for Structural
 Steel Joints [Metric].
 A500/A500M-07.....Standard Specification for Cold-Formed Welded
 and Seamless Carbon Steel Structural Tubing in
 Rounds and Shapes.
 A501-07.....Specification for Hot-Formed Welded and Seamless
 Carbon Steel Structural Tubing.
 A615/A615M-07.....Standard Specification for Deformed and Plain
 Billet-Steel Bars for Concrete Reinforcement.
 A992/A992M (REV A-06)...Standard Specification for Steel for Structural
 Shapes for Use in Building Framing.

A996/A996M (REV A-06)...Standard Specification for Rail-Steel and Axel-Steel Deformed Bars for Concrete Reinforcement.

E488-96(R2003).....Standard Test Method for Strength of Anchors in Concrete and Masonry Elements.

E. International Building Code (IBC) 2009 Edition.

F. VA Seismic Design Requirements, H-18-8, December 2008.

G. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

Seismic Restraint Manual - Guidelines for Mechanical Systems, 1998 Edition and Addendum.

1.5 REGULATORY REQUIREMENT

A. IBC 2009.

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. Piping in boiler plants and equipment rooms less than 1 ¼ inches inside diameter.
4. All other piping less than 2 ½ 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 ½ 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.

PART 2 - PRODUCTS

2.1 STEEL

- A. Structural Steel: ASTM A36 or A992.
- B. Structural Tubing: ASTM A500, Grade B.
- C. Steel Pipe: ASTM A53/A53M, Grade B.
- D. Bolts & Nuts: ASTM A307 or A325.

2.2 CAST-IN-PLACE CONCRETE:

- A. Concrete: 28 day strength, $f'c = 25 \text{ MPa}$ (3,000 psi).
- B. Reinforcing Steel: ASTM A615/615M or ASTM A996/A996M deformed.

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 MECHANICAL DUCTWORK AND PIPING; ELECTRICAL BUSWAYS, CONDUITS, AND CABLE TRAYS; AND TELECOMMUNICATION WIRES AND CABLE TRAYS

- A. Support and brace mechanical ductwork and piping; electrical busways, conduits and cable trays; and telecommunication wires and cable trays including boiler plant stacks and breeching to resist directional forces (lateral, longitudinal and vertical).
- B. Brace duct and breeching branches with a minimum of 1 brace per branch.
- C. 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.
- D. 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.

- E. 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.

3.3 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.

3.4 FACADES AND GLAZING

- A. Install attachments to structure for all façade materials as shown on construction drawings to ensure strength against applicable seismic forces at the project location.

3.5 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 filing cabinets that are more than 2 drawers high to the floor or walls, and equip all drawers with properly engaged, lockable latches.

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