TECHNICAL SPECIFICATIONS

Volume 1 of 2

Department of Veterans Affairs
Louis Stokes Cleveland VA Medical Center
WADE PARK
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RELOCATE AND EXPAND ENDOSCOPY

Project No. 541-16-107

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Safety and Health During Construction Activities Enclosure 1 - Infection Control During Construction

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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 SAFETY REQUIREMENTS

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

1.2 GENERAL INTENTION

A. Project Description: The addition would be located on the North side of the Medical Center, near the main elevators, and would require approximately 4,800 square feet of space. Existing SCI Clinic is 3,000 square feet. New configuration would add 3 Exam Rooms, additional waiting room space, and required clinical support areas.

1. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for the Enhance Medical, Specialty Care, and Administrative Services project as required by drawings and specifications.

B. Visits to the site by Bidders will be in accordance with FAR clause "52.236-27 Site Visits."

C. Offices of Perspectus Architecture and Fredrick, Fredrick and Heller Engineers, as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.

D. Before placement and installation of work subject to tests by testing laboratory retained and paid for by the Contractor, the Contractor shall notify the COR in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three work days unless otherwise designated by the COR.

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.

1. Contractor shall designate a full time superintendent dedicated solely to this project and who will be on site for the duration of the project.

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.

1. General Contractor shall designate a full time superintendent dedicated solely to the project and who will be on site for the duration of the project.

G. Training:

1. All employees of general contractor or subcontractors shall have the following required hours of OSHA certified Construction Safety course and /or other relevant competency training, as determined by VA CP with input from the ICRA team.

a. Superintendent: 30 hours

b. All other Workers: 10 hours

2. Submit training records of all such employees for approval before the start of work.

1.3 STATEMENT OF BID ITEMS

A. BID ITEM I (Base Bid) - Relocate and Expand Endoscopy: Contractor to provide all labor, equipment and materials necessary to complete the work as described on the documents. Work includes, but is not limited to general construction, alterations, structural, mechanical, plumbing, fire protection, and electrical work, utility systems, asbestos abatement, and necessary removal of existing structures and construction and certain other items. All work to be completed within **XXX** calendar days from date of receipt of Notice to Proceed.

B. BID ITEM II (Base Bid - Deduct Alternate 1): Glass Partitions - Bid shall include all work described in Bid Item I, except for the following scope modifications:

1. Delete all work associated with the construction of the low walls and windows dividing:

Patient Room 2-B301N and Door 2-B301B

Patient Room 2-B301N and Patient Room 2-B301M

Patient Room 2-B301H and Hallway 2-B301G

Alcove 2-B301F and Patient Room 2-B301I

Patient Room 2-B301I and Patient Room 2-B301J

Patient Room 2-B301J and Nurses 2-B301BA

Nurses 2-B301BA and Patient Room 2-B301K

Door 2-B301B and Patient Room 2-B301O

Patient Room 2-B301O and Patient Room 2-B301P

Patient Room 2-B301P and Patient Room 2-B301Q

Patient Room 2-B301Q and Patient Room 2-B301R

Patient Room 2-B301S and Patient Room 2-B301T

Patient Room 2-B301T and Patient Room 2-B301U

Patient Room 2-B301X and Patient Room 2-B301Y

Patient Room 2-B301Y and Patient Room 2-B301Z

Patient Room 2-B301S and Patient Room 2-B302B

Patient Room 2-B302C and Patient Room 2-B301J

Coordinate with Mechanical and Electrical drawings.

C. BID ITEM III (Base Bid - Deduct Alternate 2): Wall Protection - Bid shall include all work described in Bid Item I, Bid Item II except for the following scope modifications:

1. Remove all decorative wall protection with the exception of the Procedure Rooms

2. Replace all decorative wall protection in the procedure rooms with solid color wall protection

D. BID ITEM IV (Base Bid - Deduct Alternate 3): Phase 3 - Bid shall include all work described in Bid Item I, Bid Item II, and Bid Item III except for the following scope modifications:

1. Remove from scope all work related to the construction of Phase 3 – All existing spaced within Phase 3 will remain.

2. Remove from scope all work related to the creation of Toilet Room 2B-302A and Patient RM 16 2B-302B. Door 2B301A to remain.

Refer to drawings for additional information

1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

A. AFTER AWARD OF CONTRACT, zero (0) sets of specifications and drawings will be furnished.

1.5 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.

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

B. Security Procedures:

1. General Contractor’s employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.

2. 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 arrangements can be provided for the

employees. This notice is separate from any notices required for utility shutdown described later in this section.

3. No photography of VA premises is allowed without written permission of the Contracting Officer.

4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Key Control:

1. The General Contractor shall provide duplicate keys and lock combinations to the COR 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.

3. All construction doors/access doors must use VA key system and remain locked at all times from the corridor/exterior side.

D. Document Control:

1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".

2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.

3. Certain documents, sketches, videos or photographs and drawings may be marked "Law Enforcement Sensitive" or "Sensitive Unclassified". Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Contracting Officer upon request.

4. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.

5. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.

6. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".

7. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).

   a. Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.

   b. "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.

E. Motor Vehicle Restrictions

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

2. No parking is available at Medical Center for contractors and Contractor commuter vehicles shall be parked off-site.

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. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

D. Working space and space available for storing materials shall be as determined by the COR.

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, except as permitted by COR where required by limited working space.

1. Do not store materials and equipment in other than assigned areas.

2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient that do not impede with Medical Center activities. 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 and review and approval by COR.

4. All noise generating operations which are disruptive to Hospital operations as determined by the COR, including but not limited to cutting of ceilings, walls and floor coring, drilling etc., shall be scheduled during weekends or between 6:00 PM and 7:00 AM on weekdays, unless otherwise determined by COR. Include all premium time charges in Bid.

G. Phasing:

1. The work for this project is intended to be accomplished in multiple phases as described by the Drawings. If the Contractor elects to create additional phases, Contractor shall furnish the COR with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the COR two weeks in advance for final approval of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such dates to ensure accomplishment of this work in successive phases mutually agreeable to COR and Contractor. Final inspection of each phase before moving to the next phase will be required through the Contracting Officer and COR.

2. The Medical Center must maintain its operation 24 hours a day 7 days a week. Therefore, any interruption in service must be scheduled and coordinated with the COR to ensure that no lapses in operation occur. It is the CONTRACTOR'S responsibility to develop a work plan and schedule detailing, at a minimum, the procedures to be employed, the equipment and materials to be used, the interim life safety measure to be used during the work, and a schedule defining the duration of the work with milestone subtasks.

3. To insure proper execution of each phase, Contractor shall furnish the COR with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the

COR two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to insure accomplishment of this work in successive phases mutually agreeable to COR and Contractor.

H. When a section of the building 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 Fire Department or Company (Department of Veterans Affairs or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.

3. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. These routes whether access or egress shall be isolated from the construction area by temporary partitions and have walking surfaces, lighting etc to facilitate patient and staff access. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.

I. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR.

1. No utility service such as water, gas, medical gases, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COR. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without 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 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY for additional requirements.

2. Contractor shall submit a request to interrupt any such services to COR, in writing, three (3) work/business days in advance of a minor shut down and two (2) weeks in advance of a major 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, including crane and dock usage, must be requested, in writing, at least 14 calendar days prior to the desired time and shall be performed as directed by the COR.

5. In case of a contract construction emergency, service will be interrupted on approval of COR. Such approval will be confirmed in writing as soon as practical.

6. All utility service shutdowns such as water, gas, medical gasses, steam, sewers, electricity, or fire protection shall occur during off-hours or weekends at no additional cost to the Government.

J. 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 6" beyond the project boundary line. 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.

K. 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.

2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the COR.

L. Coordinate the work for this contract with other construction operations as directed by COR. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.

1.7 ALTERATIONS

A. Survey: Before any work is started, the Contractor shall make a thorough survey with the COR 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. Any discrepancies between drawings and existing conditions at site.

4. Designated areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and COR.

B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COR, to be in such condition that their use is impossible or impractical, shall be

furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).

C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and COR together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:

1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's 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 ABOVE-CEILING WORK REQUIREMENTS

A. For all work in public/staff areas that includes removal of ceiling tiles:

1. Use a pre-fabricated mobile containment unit to control dust.

2. Use an air scrubber to maintain negative pressure and remove airborne dust particles inside the mobile containment unit.

B. Before starting work, obtain an Above Ceiling Work Permit (ACWP) from the COR (attached).

C. The ACWP must be requested at least five business days in advance of the requested start date of the work. A floor plan identifying the work location must be included in the ACWP request submitted to the VA COR. If an ACWP is not obtained in advance, then the VA will stop work.

D. Clear the work area of patients, staff, and visitors. Cover desks, chairs, floors, or other surfaces that may be subject to falling debris or dust.

E. Only one ceiling tile shall be removed at a time. If more than one ceiling tile is removed, a fire watch shall be posted.

F. When work is complete each day, replace the ceiling tile, remove the mobile containment unit/dust covers, and perform a cleanup of the area before allowing the area to be reoccupied. If work will exceed one day, penetrations make in smoke walls or rated fire walls shall be temporarily sealed with fire retardant material, such as mineral wool. Ceiling tiles shall be replaced before leaving for the day.

G. Upon completion of the work, request the VA COR to perform a follow-up inspection of the work, so that the ACWP can be closed out.

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 or noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COR.

2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.

3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. 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 COR.

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

      40 CFR 261.....Identification and Listing of Hazardous Waste

      40 CFR 262.....Standards Applicable to Generators of Hazardous Waste

      40 CFR 263.....Standards Applicable to Transporters of Hazardous Waste

      40 CFR 761.....PCB Manufacturing, Processing, Distribution in Commerce, and use Prohibitions

      49 CFR 172.....Hazardous Material tables and Hazardous Material Communications Regulations

      49 CFR 173.....Shippers - General Requirements for Shipments and Packaging

49 CRR 173.....Subpart A General

49 CFR 173.....Subpart B Preparation of Hazardous Material for Transportation

49 CFR 173.....Subpart J Other Regulated Material; Definitions and Preparation

TSCA.....Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7

1.10 RESTORATION

A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the COR. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the COR before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.

B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.

C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's 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 Bid Solicitation GENERAL CONDITIONS.

1.11 LAYOUT OF WORK

A. The Contractor shall lay out the work 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 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 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. Establish and plainly mark lines for each partition and such other lines that are reasonably necessary to properly assure that location, orientation, and elevations established are in accordance with lines and elevations shown on contract drawings.

1.12 AS-BUILT DRAWINGS

A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.

B. All variations shall be shown in the same general detail as used in the contract drawings. To ensure compliance, as-built drawings shall be made available for the Architect's or COR's review, as often as requested.

C. Contractor shall submit two approved completed sets of as-built drawings within 14 calendar days after the acceptance of the project by the COR, in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.13 USE OF ROADWAYS

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

shall be constructed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges and at the conclusion of construction, contractor shall restore these areas to their original condition.

1.14 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 COR. If the equipment is not installed and maintained in accordance with the following provisions, the COR will withdraw permission for use of the equipment.

2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Installation of temporary electrical equipment or devices shall be in accordance with NFPA 70, National Electrical Code, (2014 Edition), Article 590, *Temporary Installations.* Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.

3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.

4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.

5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.

6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government.

B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.

C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

D. Any damage to the equipment or excessive wear due to prolonged use will be repaired or replaced by the contractor at the contractor’s expense.

1.15 TEMPORARY USE OF EXISTING ELEVATORS

A. Use of existing elevators for handling building materials and Contractor's personnel will be permitted subject to following provisions:

1. Contractor makes all arrangements with the COR for use of elevators. The COR will ascertain that elevators are in proper condition. Contractor may use elevators for daily use for personnel only between the hours of 7:00 am and 6:00 pm and for special nonrecurring time intervals when permission is granted. Personnel for operating elevators will not be provided by the Department of Veterans Affairs.

2. Contractor to develop a proposed elevator usage plan for review and approval by COR.

3. 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.

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.

1.16 TEMPORARY TOILETS

A. Contractor may have for use of Contractor's workmen, such toilet accommodations as may be assigned to Contractor by the COR. 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.

1.17 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 and repair or restore the infrastructure as required.

C. 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, as determined by the COR, will not be permitted. Maintain minimum temperatures as specified for various materials.

D. 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.

E. 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 COR's discretion) of use of water from Medical Center's system.

F. 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 COR's discretion), of use of steam from the Medical Center's system.

1.18 NEW TELEPHONE EQUIPMENT

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

1.19 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.

1.20 INSTRUCTIONS

A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and verbal instructions when required by the various sections of the specifications and as hereinafter specified.

B. Manuals: Maintenance and operating manuals (one hard copy each and one electronic copy each) for each separate piece of equipment shall be

delivered to the COR coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed 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 COR and shall be considered concluded only when the COR 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 COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

D. Concurrent with the AS-BUILT DRAWINGS, Contractor shall additionally submit complete Maintenance and Operating Manuals as follows:

1. Submit one hard copy each and one electronic copy within 14 calendar days after the acceptance of the project by the COR, in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

2. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

3. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

4. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.

5. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.

1.21 GOVERNMENT-FURNISHED PROPERTY

A. The Government shall deliver to the Contractor, the Government-furnished property shown on the drawings. (Reference FAR 52.249)

B. Equipment furnished by Government to be installed by Contractor will be furnished to Contractor at the Medical Center.

C. Storage space for equipment will be provided by the Government and the Contractor shall be prepared to unload and store such equipment therein upon its receipt at the Medical Center.

D. Notify Contracting Officer in writing, 60 days in advance, of date on which Contractor will be prepared to receive equipment furnished by Government. Arrangements will then be made by the Government for delivery of equipment.

1. Immediately upon delivery of equipment, Contractor shall arrange for a joint inspection thereof with a representative of the Government. At such time the Contractor shall acknowledge receipt of equipment described, make notations, and immediately furnish the Government representative with a written statement as to its condition or shortages.

2. Contractor thereafter is responsible for such equipment until such time as acceptance of contract work is made by the Government.

E. Equipment furnished by the Government will be delivered in a partially assembled (knock down) condition in accordance with existing standard commercial practices, complete with all fittings, fastenings, and appliances necessary for connections to respective services installed under contract. All fittings and appliances (i.e., couplings, ells, tees, nipples, piping, conduits, cables, and the like) necessary to make the connection between the Government furnished equipment item and the utility stub-up shall be furnished and installed by the contractor at no additional cost to the Government.

F. Completely assemble and install the Government furnished equipment in place ready for proper operation in accordance with specifications and drawings.

G. Furnish supervision of installation of equipment at construction site by qualified factory trained technicians regularly employed by the equipment manufacturer.

1.22 RELOCATED EQUIPMENT AND ITEMS

A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing items indicated to be relocated by Contractor.

B. Perform relocation of such equipment or items at such times and in such a manner as directed by the COR.

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. 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.

- - - E N D - - -

OSHA Requirements and Safety and Health Regulations

PART 1 - OSHA Requirements

1.1 General

A. Contractors are required to comply with the Occupational Safety and Health Act of 1970. This will include the safety and health standard found in Code of Federal Regulations (CFR) 1910 and 1926. Copies of those standards can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20420.

B. In addition, Contractor will be required to comply with other applicable Medical Center policies and safety regulations. These policies and regulations will be presented to the Contractor at the pre-construction meeting. Each of the Contractor's employees will be required to read the statement of policies and regulations, and sign an acknowledgment that such policies and regulations are understood. Signed acknowledgment will be returned to the Contract Officer Technical Representative.

C. Contractors involved with the removal, alteration or disturbance of asbestos-type insulation or materials or lead paint will be required to comply strictly with the regulations found in CFR 1910.1001 and the appropriate Environmental Protection Agency (EPA) lead regulations regarding disposal of asbestos or lead paint. Assistance in identifying asbestos or lead can be requested from the Medical Center's Industrial Hygienist and the COR.

D. Contractors entering locations of asbestos contamination or lead paint residue (i.e., pipe, basements, walls, windows) shall be responsible for providing respiratory protection to their employees and ensuring respirators are worn in accordance with the Occupational Safety and Health Administration (OSHA) [CFR 1910.1001(g)]. Asbestos-or lead paint-contaminated areas shall be defined on project drawings. The minimum equipment requirements will be a half-mask air-purifying respirator equipped with high efficiency filters and disposable coveralls, or as determined by air monitoring results.

E. Contractor, along with other submittals and at least two weeks prior to bringing any materials on-site, must submit a complete list of chemicals the Contractor will use and Material Safety Data Sheets (MSDS) for all hazardous materials as defined in OSHA 1910.1200(d), Hazard Determination. Contracting Officer shall have final approval of all materials brought on site.

F. The Contractor will be held solely responsible for the safety and health of their employees. The contractor will also be held responsible for protecting the health and safety of the VA Community (patients, staff, and visitors) from the unwanted effects of construction. VA staff will monitor the Contractor's performance in complying with all safety and health aspects of the project. Severe or constant violations may result in an immediate work stoppage or request for a Compliance Officer from the Occupational Safety and Health Administration.

G. During all phases of demolition, construction and alterations, Contractors are required to understand and strictly follow National Fire Protection Association (NFPA) 241, Standard for Safeguarding Construction, Alteration and Demolition Operations. The Medical Center's Safety and Occupational Health Specialist or Industrial Hygienist will closely monitor the work area for compliance. Appropriate action will be taken for non-compliance.

PART 2 - Specific VA Medical Center Fire and Safety Policies, Procedures and Regulations

2.1 Introduction.

A. The safety and fire protection of patients, employees, members of the public and government is one of continuous concern to this Medical Center.

B. Contractors, their supervisors and employees are required to comply with Medical Center policies to ensure the occupational safety and health of all. Failure to comply may result in work stoppage.

C. While working at this Medical Center, contractors are responsible for the occupational safety and health of their employees. Contractors are required to comply with the applicable OSHA

standards found in 29 CFR 1910 for general industry and 29 CFR 1926 for construction. Failure to comply with these standards may result in work stoppage and a request to the Area Director of OSHA for a Compliance Officer to inspect your work site.

D. Contractors are to comply with the requirements found in the National Fire Protection Association (NFPA) 241, Building Construction and Demolition Operation, and NFPA 51B, Fire Prevention in Use of Cutting and Welding Processes.

E. Questions regarding occupational safety and health issues can be addressed to the Medical Center Safety and Occupational Health Specialist (ext. 4172) or Industrial Hygienist (ext. 4628).

F. Smoking is not permitted in any interior areas of the Medical Center, including all interior stairwells, tunnels, construction and/or service/maintenance sites. Compliance with this policy by your direct and subcontracted labor force is required.

2.2 Hazard Communication

A. Contractors shall comply with OSHA Standard 29 CFR 1926.59, Hazard Communication.

B. Contractors shall submit to the VA Safety Officer, copies of MSDS covering all hazardous materials to which the Contractor and VA employees are exposed.

C. Contractors shall inform the Safety Officer of the hazards to which VA personnel and patients may be exposed.

D. Contractors shall have a written Hazard Communication Program available at the construction site, which details how the Contractor will comply with 29 CFR 1926.59.

2.3 Fires

A. All fires must be reported. In the event of a fire in your work area, use the nearest pull box station, and also notify Medical Center staff in the immediate area. Emergency notification can also be accomplished by dialing ext. 2222.

B. Be sure to give the exact location from where you are calling and the nature of the emergency. If a Contractor experiences a fire that was rapidly extinguished by your staff, you still must notify the Construction Safety Officer (ext. 4172) within an hour of the event so that an investigation of the fire can be accomplished.

2.4 Fire Alarms, Smoke Detection and Sprinkler System

If the nature of your work requires the deactivation of the fire alarm, smoke detection or sprinkler system, you must notify the Safety Office. Notification must be made well in advance so that ample time can be allowed to deactivate the system and provide alternative measures for fire protection. Under no circumstance is a Contractor allowed to deactivate any of the fire protection systems in this Medical Center.

2.5 Smoke Detectors

False alarms will not be tolerated. You are required to be familiar with the location of the smoke detectors in your work area. When performing cutting, burning or welding or any other operations that may cause smoke or dust, you must take steps to temporarily cover smoke detectors in order to prevent false alarms. Failure to take the appropriate action

will result in the Contracting Officer assessing actual costs for government response for each false alarm that is preventable. Prior to covering the smoke detectors, the Contractor will notify the Safety Officer, who will also be notified when the covers are removed.

2.6 Hot Work Permit

A. Hot work is defined as operations including, but not limited to, cutting, welding, thermal welding, brazing, soldering, grinding, thermal spraying, thawing pipes or any similar situation. If such work is required, whenever possible the Contractor must notify the COR no less than one day in advance of such work. The Competent Hot Work Supervisor (CHWS) will inspect the work area and issue a Hot Work Permit, authorizing the performance of such work.

B. All hot work will be performed in compliance with the Engineering Service Policy 138-047 regarding Hot Work Permits and NFPA 241, Safeguarding Construction, Alternation and Demolition Operations; and NFPA 51B, Fire Prevention in Use of Cutting and Welding Processes; and applicable OSHA standard. A hot work permit will only be issued to individuals familiar with these regulations.

C. A Hot Work Permit will be issued only for the period necessary to perform such work. In the event the time necessary will exceed one day, a Hot Work Permit may be issued for the period needed; however, the CHWS will inspect the area daily. Hot Work Permit will apply only to the location identified on the permit. If additional areas involve hot work, then additional permits must be requested.

D. Contractors will not be allowed to perform hot work processes without the appropriate permit.

E. Any work involving the Medical Center's fire protection system will require advance notification. Under no circumstance will the Contractor or employee attempt to alter or tamper with the existing fire protection system.

F. Thirty minutes following completion of the hot work, the Fire Watch will perform an inspection of the area to confirm that sparks or drops of hot metal are not present.

2.7 Temporary Enclosures

Only non-combustible materials will be used to construct temporary enclosures or barriers at this Medical Center. Plastic materials and fabrics used to construct dust barriers must conform to NFPA 701, Standard Methods of Fire Tests for Flame-Resistant Textiles and Films.

2.8 Flammable Liquids

All flammable liquids will be kept in approved safety containers. Only the amount necessary for your immediate work will be allowed in the building. Flammable liquids must be removed from the building at the end of each day.

2.9 Compressed Gas Cylinders

Compressed gas shall be secured in an upright position at all times. A suitable cylinder cart will be used to transport compressed gas cylinders. Only those compressed gas cylinders necessary for immediate work will be allowed in occupied buildings. All other compressed gas cylinders will be stored outside of buildings in a designated area. Contractors will comply with applicable standards compressed gas cylinders found in 29 CFR 1910 and 1926 (OSHA).

2.10 Internal Combustion Engine-Powered Equipment

Equipment powered by an internal combustion engine (such as saws, compressors, generators, etc.) will not be used in an occupied building. Special consideration may be given for unoccupied buildings only if the OSHA and NFPA requirements have been met.

2.11 Powder-Activated Tools

The operator of powder-activated tools must be trained and certified to use them. Powder-activated tools will be kept secured at all times. When not in use, the tools will be locked up. When in use, the operator will have the tool under his immediate control.

2.12 Tools

A. Under no circumstances will equipment, tools and other items of work to be left unattended for any reason. All tools, equipment and items of work must be under the immediate control of your employee.

B. If for some reason a work area must be left unattended, then tools and other equipment must be placed in an appropriate box or container and locked. All tool boxes, containers or any other device used for the storage of tools and equipment will be provided with a latch and padlock, and will be kept locked at all times, except for putting in and removing tools.

C. All doors to work areas will be closed and locked when rooms are left unattended. Failure to comply with this policy will be considered a violation of VA Regulations 1.218(b), Failure to comply with signs of a directive and restrictive nature posted for safety purposes, and subject to a $50.00 fine. Subsequent similar violations may result in both imposition of such a fine as well as the Contracting Officer taking

action under the contract's Accident Prevention Clause [Federal Acquisition Regulation (FAR) 52.236-13] to suspend all contract work until violations may be satisfactorily resolved, or under FAR 52.236-5, Material and Workmanship Clause, to remove from the worksite any personnel deemed by the Contracting Officer to be careless to the point of jeopardizing the welfare of facility patients or staff.

D. You must report any tools or equipment that are missing to the VA Police Department.

E. Tools and equipment found unattended will be confiscated and removed from the work area.

2.13 Ladders

Ladders must not be left unattended in an upright position. Ladders must be attended at all times or taken down, and chained securely to a stationary object.

2.14 Scaffolds

All scaffolds will be attended at all times. When not in use, an effective barricade (fence) will be erected around the scaffold to prevent use by unauthorized personnel (Reference OSHA 1926, Subpart L).

2.15 Excavations

The contractor shall comply with OSHA 1926, Subpart P. An OSHA Competent Person must be on site during the excavation. The contractor shall coordinate with the COR and utility companies prior to the excavation to identify underground utilities tanks, etc. All excavations left unattended will be provided with a barricade suitable to prevent entry by unauthorized persons.

2.16 Storage

You must make prior arrangements with the COR for the storage of building materials. Storage will not be allowed to accumulate in the Medical Center buildings.

2.17 Trash and Debris

You must remove all trash and debris from the work area on a daily basis. Trash and debris will not be allowed to accumulate inside or outside of the buildings. You are responsible for making arrangements for removal of trash from the Medical Center facility.

2.18 Protection of Floors

It may be necessary at times to take steps to protect floors from dirt, debris, paint, etc. A tarp or other protective covering may be used. However, you must maintain a certain amount of floor space for the safe passage of pedestrian traffic. Common sense must be used in this matter.

2.19 Signs

Signs must be placed at the entrance to work areas warning people of your work. Signs must be suitable for the condition of the work. Small pieces of paper with printing or writing are not acceptable. The VA Medical Center (VAMC) Safety Officer or COR can be consulted in this matter.

2.20 Accidents and Injuries

Contractors must report all accidents and injuries involving their employees.

2.21 Infection Control

Contractors must control the generation of dust and the contamination of patient care surfaces, supplies and equipment. During demolition phases of the construction:

A. The construction area shall be under negative pressure, ensuring there is an appreciable flow of clean air from the VA-occupied portion of the facility into the construction area. The airflow shall be sufficiently strong enough to draw in the plastic door flaps commonly located at the construction entrance or at the specific site within the construction area.

B. Construction debris being transported through the VA-occupied portion of the facility shall be covered and/or whetted.

C. Construction employees shall remove dust-laden clothing before entering the VA-occupied portion of the facility.

D. Carpet/sticky mats shall be placed at all construction entrances, and be satisfactorily maintained so as to minimize the tracking of dust into the VA-occupied portion of the facility.

E. Dry sweeping of dust and debris is not to be performed.

(Control measures B - E above must be practiced during the construction phase.)

2.22 Confined Space Entry

A. Contractor will be informed that the workplace contains permit-required confined space, and that permit-space entry is allowed only through compliance with a permit space program meeting the requirements of 29 CFR 1910.146 and 1926.21(b)(6).

B. Contractor will be apprised of the elements including the hazards identified and the Medical Center's (last employer) experience with the space that makes the space in question a permit space.

C. Contractor will be apprised of any precautions or procedures that the Medical Center has implemented for the protection of employees in or near permit space where Contractor personnel will be working.

D. Medical Center and Contractor will coordinate entry operations when both Medical Center personnel and Contractor personnel will be working in or near permit spaces as required by 29 CFR 1910.146(d)(ii) and 1926.21(b)(6).

E. Contractor will obtain any available information regarding permit space hazards and entry operation from the Medical Center.

F. At the conclusion of the entry operations, the Medical Center and Contractor will discuss any hazards confronted or created in permit spaces.

G. The Contractor is responsible for complying with 29 CFR 1910.246(d) through (g) and 1926.21(b)(6). The Medical Center, does not provide rescue and emergency services required by 29 CFR 1910.246(k) and 1926.21(b)(6).

2.23 Contractor Parking and Material Delivery

There is no Contractor parking on Medical Center property unless the contract drawings show a designated staging area that is under the Contractor’s control.

Contractor's delivery of building materials tools, etc., must be pre-arranged with the Project Manager.

Pre Construction Risk Assessment (PCRA)

Project: _____ Project/Contract #: _____

This form may be used for projects or activities to determine if a Site Specific Safety Plan (SSSP) is necessary. If the contractor or vendor is not working independently (VAMC Supervisor is present and in control of the contractor) and the job is short duration (less than five working days) and the hazard analysis does not include any high risk activities, then Occupational Health and Safety may allow work without submitting a SSSP.

Activity	Yes	High Risk
1. Respiratory protection is required for the work being conducted List specifics: (activity being preformed, PPE Being used, Training, Fit testing).		
2. Hearing protection is required for the work being conducted List specifics: (Type of noise; impact, constant, start up).		
3. Other personal protective equipment is required for the work being conducted, what activity? _____ List specifics: (Gloves, safety Glasses, hard hat, steel toes, overalls).		
4. Are there overhead hazards associated with the activity being conducted?		Yes

Wires, power, communication, grounding, location(s), signage. List specifics:		
5. Work is being conducted in a confined space. Permit required? Training? List specifics: Tanks, sewer, tunnels, Rescue Team notification.		PRCS Only
6. Ladders will be necessary for the work being conducted.		
7. Scaffolding will be necessary for the work being conducted. List specifics:		Greater than six feet
8. Other work platforms will be necessary for the work being conducted. List specifics: Rails, toe boards, netting		Greater than six feet
9. Fall protection is required for the work being conducted. List specifics:		Yes
10. ASBESTOS Abatement Exposure to asbestos may be associated with the work being conducted. List specifics: Renovation, Demolition, Emergency Response 29 CFR 1910.1001.		Yes unless approved by the Asbestos Manager

Activity	Yes	High Risk
11. Hazardous materials will be used. MSDSs will be provided for known substances List specifics: 29 CFR 1910.1200.		
12. Hot work (Cutting, Welding, Brazing, etc). Use of VAMC Cleveland Hot Work Policy (ECP 138-047) is required.		
13. Additional ventilation will be necessary for the work being conducted. List specifics: Reason for need of ventilation, confined space, foul odor, excessive heat.		
14. Operation and maintenance of electric power generation, control, transformation, transmission, and distribution lines and equipment are necessary for the work being conducted. List specifics:		Yes
15. Work will be conducted on energized equipment. Use of VAMC Cleveland Working on Energized Equipment policy (138-034) is required. List specifics: list voltages in area, emergency procedures.		Yes

16. Other electrical work will be conducted. List specifics:		
17. Lock Out/Tag Out will be necessary for the work being conducted. List specifics:		
18. Cranes, derricks, or slings will be necessary for the work being conducted. List specifics:		Yes
19. Excavating will be necessary for work being conducted. List site specifics:		Yes

Activity	Yes	High Risk
20. Excavating or earthmoving equipment will be used. List specifics:		
21. Industrial trucks will be used. List specifics:		
22. Other motorized vehicles will be used. List specifics:		
23. Concrete and masonry construction operations will be necessary for work being conducted. List specifics: % of recycled components		
24. Steel erection activities will be necessary for the work being conducted. List specifics: New Steel % of recycled material,		Yes

25. Alteration, conversion, or improvement of existing electric transmission and distribution lines and equipment will be necessary for the work being conducted. List specifics:		Yes
26. Hand and portable powered tools or other hand-held equipment will be used.		
27. Compressed gas or compressed air equipment is necessary for work being conducted.		
28. List all other hazardous activities that will be conducted or potentially hazardous equipment that will be used including vibration hazards.		

Activity	Yes	High Risk
29. Infection Control Risks identified. Infection Control Risk Assessment (ICRA) required- refer to Enclosure (1).		Yes unless approved by IC
30. Life Safety Risks identified. Interim Life Safety Risk Assessment Form -Attachment (4) - must be completed and submitted.		
31. Emergency Procedures Identified. Fire, severe weather, utility failure, etc.		
32. Demolition will be necessary for the work being conducted.		Yes
33. *New Construction:* Minimum __%__ of total project waste shall be diverted from landfill. Recycled aggregate, Concrete, Steel.		
34. *Interior Remodeling:* Minimum _%___ of total project waste shall be diverted from landfill. a) Ceiling tile b) Steel c) Carpet		

Submitted by (Contractor)_____ Date: _____

Reviewed by (COR) _____ Date: _____

Reviewed by (CSM) _____ Date: _____

SSSP Required Yes No

Construction Safety Poster – Cleveland VA

Project:

Project #:

VAMC Emergency Number – 2222

Infection Control Category:

Fire Extinguisher Locations:

Fire Alarm Location:

Safe Area of Refuge Location:

Evacuation Assembly Location:

MSDS Location:

COR: _____

Phone: _____

Interim Life Safety Risk Assessment Form

Project:_____ **Date:**_____

Location: _____

Estimated completion Date _____ **Actual Completion Date** _____

Life Safety Risk Assessment

Guidelines:	Yes/ No	Comments	ILSM
1. Will exit egress routes from occupied areas remain unchanged?			
2. Will exit stairs remain unobstructed and fire separated?			
3. Will fire and smoke compartments remain intact and unchanged?			
4. Will fire alarm detection systems remain functional and unimpaired?			
5. Will fire suppression systems remain function and unimpaired?			
6. Will construction area be separated by noncombustible smoke tight partitions?			
7. Will emergency access by fire department remain unobstructed?			
8. Will normal distances to exits be maintained?			
9. Will all hazardous areas be protected?			

Interim Life Safety Measures (ISLM)
General Requirements

A. Ensure Egress

B. Emergency Forces Access

C. Fire Department Notification

D. Ensuring Operational Life Safety Systems

E. Temporary Construction

F. Additional Fire Fighting Equipment

G. Control Combustible Loading

H. Conduct 2 Fire Drills Per Shift in All Areas

I. Conduct 2 Fire Drills Per Shift in Local Area

J. Increase Hazard Surveillance

K. Compartmentation Training of Personnel

L. Conduct Organizational Training on Life Safety

M. Conduct Additional Training on Incident Response

N. Institute a Fire Watch

Life Safety Narrative:

_____

_____

_____

_____

_____

_____

_____

_____

_____

Assessment Performed By:_____

Contracting Officer Representative

Assessment Reviewed By:_____

VAMC Cleveland Occupational Health and Safety

Contractor Safety and Security Orientation

In order to promote safety in construction activities at VAMC Cleveland, all contract employees will receive orientation to communicate facility-specific safety concerns. This document provides examples of discussion points used to give contractors the necessary site-specific safety and procedural information. Refer to the Infection Control During Construction program for Infection Control Orientation discussion points.

Check all that apply:

	Specific Items on the Hazardous Work Activity Checklist (Attachment 2)
	Stop Work Authority
	Confined Space Entry Requirements
	Obtaining and Updating Hot Work Permits
	Interim Life Safety Measures (Attachment 4)
	.Job Site Security
	Contractor ID Badge Requirements
	Contractor Key Requirements
	Contractor Parking Requirements
	Process for Working Before or After Normal Hours
	VA Daily Log
	Request for Information
	Other Not Previously Mentioned

Job Safety Check Sheet

Project ID:_____ COR:_____ Date:_____

Location:_____

A. Personal Protective Equipment:	**No.**	**Grade**	**N/A**	**COMMENTS –Note Improvements Needed:**
1. Hard hats in use by all personnel.	A1	1 2 3 4 5	N/A	
2. Eye protection in use by all personnel.	A2	1 2 3 4 5	N/A	
3. Hearing protection (engineering controls, double protection for high noise areas, rotation of employees).	A3	1 2 3 4 5	N/A	
4. Proper footgear and protective clothing.	A4	1 2 3 4 5	N/A	
5. Fall protection in use.	A5	1 2 3 4 5	N/A	
6. Respirators/face masks in good condition and used as required (medical evaluation and fit test).	A6	1 2 3 4 5	N/A	

B. Tools and Equipment:	**No.**	**Grade**	**N/A**	**COMMENTS –Note Improvements Needed:**
1. Tools and equipment in good condition.	B1	1 2 3 4 5	N/A	
2. All equipment properly guarded.	B2	1 2 3 4 5	N/A	
3. Electrical equipment connected properly, grounded and in good condition; GFCI; automatic magnetic cut-off for woodworking tools.	B3	1 2 3 4 5	N/A	
4. Air/sandblast hoses in good condition and properly wired.	B4	1 2 3 4 5	N/A	
5. Compressors equipped with automatic shut-off.	B5	1 2 3 4 5	N/A	
6. Ladders in good condition; tied back; extended 3 ft. beyond landing.	B6	1 2 3 4 5	N/A	

C. Scaffolding: o Suspended o Tubular o Other ***(Rope Falls Not Permitted)***	**No.**	**Grade**	**N/A**	**COMMENTS –Note Improvements Needed:**
1. Scaffold in good repair; guardrails; toe boards and wire mesh in place.	C1	1 2 3 4 5	N/A	
2. Counterweights marked with weight and in proper ratio.	C2	1 2 3 4 5	N/A	
3. Scaffold tied back and tied in.	C3	1 2 3 4 5	N/A	

4. Passageways under scaffold blocked.	C4	1	2	3	4	5	N/A	

D. Hazardous Chemicals/Air Contaminants:	**No.**	**Grade**					**N/A**	**COMMENTS –Note Improvements Needed:**
1. Hazard Communication Right-To-Know poster / written program on job.	D1		Y		N		N/A	
2. List of hazardous materials on job.	D2		Y		N		N/A	
3. Material Safety Data Sheets available.	D3		Y		N		N/A	
4. Employees are familiar with program.	D4	1	2	3	4	5	N/A	
5. Proper containers in use with correct labels.	D5	1	2	3	4	5	N/A	

E. General:	**No.**	**Y**	**N**	**N/A**	**COMMENTS –Note Improvements Needed:**
1. Safe access to work area.	E1	Y	N	N/A	
2. Contractors wearing ID Badges.	E2	Y	N	N/A	
3. Job site security maintained	E2	Y	N	N/A	
4. Good housekeeping and material storage.	E2	Y	N	N/A	
5. Barricades/debris protection/warning signs in place.	E3	Y	N	N/A	
6. Floor and wall openings properly protected.	E4	Y	N	N/A	
7. Shoring properly installed	E5	Y	N	N/A	
8. Eye wash available.	E6	Y	N	N/A	
9. First aid: Kit and certified employees.	E8	Y	N	N/A	
10. Trucks: Safe/good condition; D.O.T. regulation compliance.	E9	Y	N	N/A	

F. Fire Safety (ILSM)	**No.**	**Y**	**N**	**N/A**	**COMMENTS –Note Improvements Needed:**
1. Exits & pathways clearly marked and unobstructed.	F1	Y	N	N/A	
2. Emergency services pathway is free and unobstructed.	F2	Y	N	N/A	
3. Fire extinguishers are in place and inspected.	F3	Y	N	N/A	
4. Smoke and fire alarms operational or ILSM taken	F4	Y	N	N/A	
5. Sprinkler system operational or ILSM taken.	F5	Y	N	N/A	
6. Hot Work Permits posted.	F3	Y	N	N/A	
7. Hot work sites inspected after hot work.	F4	Y	N	N/A	
8. Smoking Policy is followed.	F5	Y	N	N/A	

G. Paperwork and Other Postings:	**No.**	**Y**	**N**	**N/A**	**COMMENTS –Note Improvements Needed:**
1. OSHA poster/log.	G1	Y	N	N/A	
2. Emergency phone number card.	G2	Y	N	N/A	
3. Drug-Free Workplace Policy Summary and poster (if applicable).	G3	Y	N	N/A	
4. Job logs and Job Safety Check Sheets.	G4	Y	N	N/A	
5. Site-Specific Safety Plan (if applicable).	G5	Y	N	N/A	

Additional Comments:

Infection Control During Construction

1. Objective. To prevent the acquisition of healthcare-associated infections in patients, healthcare workers, visitors and contractors during healthcare system construction, renovation, repair or demolition activities.

2. Policy

a. All construction, renovation, demolition and repair projects will be reviewed with Infection Control during the design/planning phase.

b. Infection Control will participate in meetings and area walk-through inspections on a routine basis.

c. All contractors, including subcontractors, must follow the infection control procedures as described in this guideline.

3. Planning Phase

a. Infections Control will participate in design/planning, as well as project kick-off meetings. The Assistant Chief, Engineering Service, Planning and Construction will notify Infection Control of all new projects.

b. Construction design and functional considerations for environmental infection control:

(1) Location of sinks and dispensers for hand washing products and hand hygiene products.

(2) Location of fixed sharps containers.

(3) Types of faucets (e.g., aerated vs. non-aerated; hand control vs. foot control).

(4) Air handling systems engineered for optimal performance, easy maintenance and repair.

(5) Types of surface finishes (e.g., porous vs. non-porous).

(6) Well-caulked walls with minimal seams.

(7) Location of adequate storage and supply areas.

(8) Appropriate location of medicine preparation areas (e.g., > 3 ft from sink).

(9) Appropriate location and type of ice machines.

(10) Appropriate materials for sinks and wall coverings.

(11) Appropriate traffic flow.

(12) Isolation rooms with anterooms as appropriate.

(13) Appropriate flooring (e.g., seamless floors in dialysis units, operating rooms).

(14) Sensible use of carpeting.

(15) Convenient location of soiled utility areas.

(16) Properly engineered areas for linen services and solid waste management.

(17) Location of main emergency generator to minimize the risk of system failure from flooding or other emergency.

c. An Infection Control Risk Assessment (ICRA) will be performed using Attachment 1. A multi-disciplinary ICRA team shall be established prior to each project. The goals of the team are to identify high-risk patient populations and locations, and to minimize the risk for airborne infection during projects and after their completion. Suggested members include: Infection Control personnel; Laboratory personnel; Executive Management or designees; Assistant Chief Engineering, Planning and Construction (or designee); Patient Safety Officer; Chiefs or designees of specialized programs (e.g., ICU, Oncology, OR); Safety Manager; Chief, Environmental Care Section; Construction administrators or designees; Architects; Design COR; Project Managers; and COR.

d. Appropriate Infection Control guidelines including PPD requirements will be reviewed with VAMC personnel, COR and Project Managers during this phase for incorporation into design and construction bid packages.

e. Mandatory adherence requirements for infection control should be incorporated into construction contracts, with mechanisms to ensure timely correction of deficiencies.

4. Pre-Construction Phase

a. Infection Control will attend the Pre-Construction meeting or the Safety and Infection Control Pre-construction meeting if held separately.

b. Infection Control will provide education to contractors and subcontractors during orientation, and on an ongoing basis as necessary. Contractor Employee Orientation Training will be completed before the start of work. Attachment 2 can be used as a guide for conducting this training.

5. Construction Phase

a. Infection Control Permits (Attachment 3) will be issued by the Infection Control Manager. The Infection Control permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if necessary.

b. Infection Control, in conjunction with VA Facilities, COR and the Contractor will conduct routine inspections of all sites. Compliance issues will be documented and addressed immediately. Attachment 4 may be used as a guide when performing these inspections.

c. Infection Control shall monitor for airborne disease (e.g., aspergillosis) as appropriate during projects. It is recommended that a baseline of conditions be established prior to the beginning of the project, and periodically reviewed during the project to determine impact of construction activities on indoor air quality by Infection Control, in conjunction with Safety. If cases of aspergillosis or other healthcare-associated airborne fungal infections occur, diagnosis confirmation will be pursued with tissue biopsies and cultures as feasible. In addition, the following shall occur:

(1) 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.

(2) Implement corrective engineering measures to restore proper pressure differentials as needed.

(3) Conduct a prospective search for additional cases.

(4) If no epidemiologic evidence of ongoing transmission exists, continue routine maintenance of the area. Conduct an environmental assessment to find and eliminate the source:

(a) Collect environmental samples from potential sources of airborne fungal spores, preferably by using a high-volume air sampler rather than settle plates.

(b) If either an environmental source of airborne fungi or an engineering problem with filtration or pressure differentials is identified, perform corrective measures to eliminate the source and route of entry.

(c) Use an antifungal biocide registered by the Environmental Protection Agency (EPA) for decontaminating structural materials.

(d) If an environmental source of airborne fungi is not identified, review infection control measures, including engineering controls, to identify potential areas for correction or improvement.

d. Medical Waste

(1) Hospital staff shall remove any medical waste, including sharps containers, from areas to be renovated or constructed prior to the start of the project.

(2) Infection Control shall be notified immediately if unexpected medical waste is encountered.

e. Temporary Construction Barriers: Construction, demolition, or renovation sites must be separated from patient-care areas and critical areas, such as Supply, Processing and Distribution and Pharmacy, by barriers that keep the dirt and dust inside the worksite.

(1) The integrity of the temporary construction barriers must assure a complete seal of the construction area from adjacent areas.

(2) If walls are used as temporary construction barriers, they shall be constructed of gypsum board or treated plywood [flame spread rating of 25 or less in accordance with American Society for Testing and Materials (ASTM) E84] on both sides of wood or metal steel studs. Walls shall be extended through suspended ceilings to floor slab/deck or roof. All joints and penetrations must be sealed. Other barriers may be used upon approval by the COR, Infection Control and Safety.

f. Environmental Control

(1) External demolition and construction activities

(a) Determine if the facility can operate temporarily on re-circulated air; if feasible, seal off adjacent air intakes.

(b) If this is not possible or practical, check the low-efficiency filter banks frequently and replace as needed to avoid buildup of particulates.

(c) Seal windows and reduce wherever possible other sources of outside air intrusion (e.g., open doors in stairwells and corridors).

(d) Avoid damaging the underground water system to prevent soil and dust contamination of the water.

(2) Internal construction, repairs and renovations

(a) Relocate patients whose rooms are adjacent to work zones, depending on their immune status, the scope of the project, the potential for generation of dust or water aerosols, and the methods used to control these aerosols.

(b) Ensure proper operation of the air-handling system in the affected area after erection of barriers and before the room or area is set to negative pressure. Return air vents should be sealed off and blocked if rigid barriers are used for containment.

(c) Create and maintain negative air pressure in work zones adjacent to patient-care areas and ensure that required engineering controls are maintained.

(d) A HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns shall be utilized. Ensure that negative air pressures occur within the work area. HEPA filtration is required where the exhaust dust may re-enter the breathing zone. HEPA filters should have American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 85 or other prefilter to extend the useful life of the HEPA. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced into the facility.

(e) Negative airflow shall be monitored inside the rigid barriers.

(f) Barriers shall be monitored to ensure their integrity; any gaps or breaks in barrier joints shall be repaired immediately.

(g) Windows in work zones shall be sealed if practical; use window chutes for disposal of large pieces of debris as needed, but ensure that the negative pressure differential for the area is maintained.

(h) In patient care areas, for major repairs that include removal of ceiling tiles and disruption of the space above the false ceiling, use plastic sheets or prefabricated plastic units to contain dust; use negative air pressure systems within this enclosure to remove dust; and either pass air through an industrial-

grade portable HEPA filter capable of filtration rates of 300-800 ft3/min., or exhaust air directly to the outside away from any air intake devices.

g. Traffic Control

(1) Designated entry and exit procedures will be defined (in conjunction with any necessary Interim Life Safety Measures) for each construction project where applicable.

(2) All egress pathways will be free of debris.

(3) Unauthorized personnel will not be allowed to enter the construction zone.

(4) Only designated elevators will be used for construction activities during scheduled times.

h. Cleaning

(1) The construction zone and adjacent entry areas shall be maintained by the contractor in a clean and sanitary manner, and will be swept and wet mopped daily or more frequently as needed to minimize dust generation. Vacuum utilizing HEPA filtration. Area shall be maintained frequently and debris shall be removed as they are created.

(2) Debris shall not be hauled through patient care areas without prior approval of the COR, Infection Control and Safety. When approved, debris shall be hauled in enclosed dust-proof containers or wrapped in plastic and sealed with duct tape. No sharp objects shall be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust.

(3) Adhesive walk-off/carpet walk-off mats, minimum 24” x 36” shall be used at all interior transitions from the construction area to occupied Healthcare System areas. These mats shall be changed as often as required to maintain clean work areas directly outside the construction area. Other methods may be utilized as approved by Infection Control and the COR.

(4) 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 48 hours.

(5) Environmental Care Service will be responsible for the routine cleaning of adjacent areas and for the terminal cleaning of the construction zone prior to the opening of the newly renovated or constructed area. Specific responsibility will be defined in the construction contract.

i. Contract Personnel Requirements

(1) Clothing shall be free of loose soil and debris upon exiting the construction zone.

(2) Personal protective equipment, including face shields, gloves, and N95 respirators will be utilized as appropriate for the task at hand. Contractors are responsible for providing personal protective equipment.

(3) Contractors entering sterile/invasive procedure areas will be provided with a disposable jump suit, head covering and shoe coverings that must be removed prior to exiting the work area. Tools and equipment must be damp-wiped prior to entry and exit from sterile and invasive procedure areas.

(4) All equipment, tools, material, etc., transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down. Tools and equipment soiled with blood and body fluids will be cleaned with an approved germicide.

j. Environmental Monitoring

(1) Infection Control, in conjunction with Facilities Management and Safety, will plan for environmental monitoring as appropriate for the project.

(2) There is no current Centers for Disease Control (CDC) recommendation regarding routine microbiologic air sampling before, during or after construction, or before or during occupancy of areas housing immuno-compromised patients. Infection Control will provide for baseline and periodic sampling as needed.

(3) Traffic control.

(4) Personal protective equipment.

(5) Water supply.

5. Completion Phase

a. After completion of construction, ventilation will meet specifications as mandated by regulatory bodies. Restore HVAC, humidity and pressure differentials; replace spent filters with new filters.

b. The area will be thoroughly cleaned and disinfected before being placed into service.

c. Potable water supply lines will be flushed before placing newly renovated or constructed areas into service. The construction contractor shall certify that the potable water is safe for use.

d. The ICRA team will submit a final report to the Assistant Chief, Engineering Service, Planning and Construction regarding the compliance/noncompliance of Infection Control precautions during the project.

Attachments

1. Infection Control Risk Assessment
2. Infection Control Contractor Orientation
3. Infection Control Permit
4. Infection Control Inspection Checklist

Infection Control Risk Assessment

Matrix of Precautions for Construction & Renovation

Step One: Using the following table, identify the *Type (A-D) of Construction Project Activity*.

TYPE A	**Inspection and Non-Invasive Activities**. Includes, but is not limited to: • Removal of ceiling tiles for visual inspection limited to 1 tile per 50 square feet. • Painting (but not sanding). • Wall covering, electrical trim work, minor plumbing and activities that do not generate dust or require cutting of walls or access to ceilings other than for visual inspection.
TYPE B	**Small scale, short duration activities that create minimal dust.** Includes, but is not limited to: • Installation of telephone and computer cabling. • Access to chase spaces. • Cutting of walls or ceiling where dust migration can be controlled.
TYPE C	**Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies.**

	Includes, but is not limited to: • Sanding of walls for painting or wall covering. • Removal of floor coverings, ceiling tiles and casework. • New wall construction. • Minor duct work or electrical work above ceilings. • Major cabling activities. • Any activity that cannot be completed within a single work shift.
TYPE D	**Major demolition and construction projects.** Includes, but is not limited to: • Activities that require consecutive work shifts. • Requires heavy demolition or removal of a complete cabling system. • New construction.

STEP 1:_____

Step Two: Using the following table, identify the *Patient Risk Groups* that will be affected.

Low Risk	Medium Risk	High Risk	Highest Risk

▪ Office areas	▪ Cardiology ▪ Echocardiography ▪ Endoscopy ▪ Nuclear Medicine ▪ Physical Therapy ▪ Radiology/MRI ▪ Respiratory Therapy	▪ CCU ▪ Emergency Room ▪ Labor & Delivery ▪ Laboratories (specimen) ▪ Newborn Nursery ▪ Outpatient Surgery ▪ Pediatrics ▪ Pharmacy ▪ Post Anesthesia Care Unit ▪ Surgical Units	▪ Any area caring for immuno-compromised patients ▪ Burn Unit ▪ Cardiac Cath Lab ▪ Central Sterile Supply ▪ Intensive Care Units ▪ Medical Unit ▪ Negative pressure isolation rooms ▪ Oncology ▪ Operating rooms including C-section rooms

Step 2:_____

Step Three: Match the…

Patient Risk Group (*Low, Medium, High, Highest*) with the planned …

Construction Project Type (*A, B, C, D*) on the following matrix, to find the …

Class of Precautions (*I, II, III or IV*) or level of infection control activities required.

(Class I-IV or Color-Coded Precautions are delineated on the following page.)

IC Matrix - Class of Precautions: Construction Project by Patient Risk

Construction Project Type

Patient Risk Group	TYPE A	TYPE B	TYPE C	TYPE D
LOW Risk Group	I	II	II	III
MEDIUM Risk Group	I	II	III	III/IV
HIGH Risk Group	I	II	III/IV	III/IV
HIGHEST Risk Group	II	III/IV	III/IV	III/IV

Note: Infection Control approval will be required when the Construction Activity and Risk Level indicate that **Class III** or **Class IV** control procedures are necessary.

Step 3:_____

Description of Required Infection Control Precautions *by Class*

	During Construction Project	Upon Completion of Project
CLASS I	1. Notify and receive permission from the COR to perform requested work. 2. Execute work by methods to minimize raising dust from construction operations. 3. Immediately replace a ceiling tile displaced	1. Notify COR for inspection once the work is complete.

	for visual inspection.	
CLASS II	1. Notify and receive permission from the COR to perform requested work. 2. Provide active means to prevent airborne dust from dispersing into atmosphere. 3. Water mist work surfaces to control dust while cutting. 4. Seal unused doors with duct tape. 5. Block off and seal air vents. 6. Place dust mat at entrance and exit of work area. 7. Remove or isolate HVAC system in areas where work is being performed.	1. Wipe work surfaces with disinfectant. 2. Contain construction waste before transport in tightly covered containers. 3. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 4. Remove isolation of HVAC system in areas where work is being performed.
CLASS III	1. Obtain and post valid Infection Control Construction Permit at each work site. Permit must be signed by COR, I.C. Nurse and General Contractor to be valid. 2. Remove or isolate HVAC system in area where work is being done to prevent contamination of duct system. 3. Complete all critical barriers, i.e., sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Construction of barrier will need to occur outside normal	1. Do not remove barriers from work area until completed project is inspected by the VA's Safety Department. 2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. Barriers are required to be removed after hours with approval of COR. 3. Vacuum work area with HEPA filtered vacuums. 4. Wet mop area with disinfectant. 5. Remove isolation of HVAC system in areas where work is being performed.

	work shifts with approval of COR. 4. Construct anteroom where possible and directed by COR. 5. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 6. Contain construction waste before transport in tightly covered containers. 7. Cover transport receptacles or carts. Tape covering unless solid lid. 8. If the spread of dust from construction personnel is not contained workers may be required to where show covers and or be vacuumed prior to leaving worksite at the discretion of the COR or I.C. Nurse. 9. Seal holes, pipes, conduits and punctures appropriately.	
CLASS IV	1. Follow all requirements listed in Class III as well as additional requirements listed below. 2. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site, or they can wear cloth or paper coveralls that are removed each time they leave the work site. 3. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.	1. Before work is turned over and accepted by the VA a certified I.H. must be used to certify cleaning as well as swab and air sampling of the area. These tests shall meet or exceed industry standards for the type of area being renovated.

Step 4: Identify the areas surrounding the project area, assessing potential impact.

Unit Below	*Unit Above*	*Lateral*	*Lateral*	*Behind*	*Front*
Risk Group	*Risk Group*	*Risk Group*	*Risk Group*	*Risk Group*	*Risk Group*

Step 5: Identify specific site of activity, e.g., patient rooms, medication room, etc.

_____

Step 6: Identify issues related to: ventilation, plumbing, electrical, in terms of the occurrence of probable outages.

_____

Step 7: Identify containment measures, using prior assessment. What types of barriers (e.g., solids wall barriers)? Will HEPA filtration be required?

_____

(Note: Renovation/construction area shall be isolated from the occupied areas during construction and shall be negative with respect to surrounding areas.)

Step 8: Consider potential risk of water damage. Is there a risk due to compromising structural integrity (e.g., wall, ceiling, roof)?

Step 9: Work hours - can or will the work be done during non-patient care hours?

Step 10: Do plans allow for adequate number of isolation/negative airflow rooms?

Step 11: Do the plans allow for the required number and type of hand washing sinks?

Step 12: Does the infection control staff agree with the minimum number of sinks for this project? *(Verify against AIA Guidelines for types and area.)*

Step 13: Does the infection control staff agree with the plans relative to clean and soiled utility rooms?

Step 14: Plan to discuss the following containment issues with the project team: traffic flow, housekeeping, debris removal (how and when).

_____

_____

_____

_____

_____

Appendix: *Identify and communicate the responsibility for project monitoring that includes infection control concerns and risks. The ICRA may be modified throughout the project. Revisions must be communicated to the Project Manager.*

General Requirements

01 00 00 - 9 Safety and Health During Construction Activities - Enclosure 1

Infection Control During Construction - Attachment 1

Infection Control Orientation for Construction Workers

The goal of the Infection Control Program is to identify and reduce the risks of acquiring and transmitting infections among patients, employees, physicians and other licensed independent practitioners, contract service workers, volunteers, students and visitors.

During construction, renovation and minor improvement projects, hidden infectious disease hazards may be released into the air, carried on dust particles or on clothing. One such hazard is fungal organisms such as Aspergillus. Aspergillus species may be found in decaying leaves and compost, plaster and drywall, and settled dust. These organisms usually do not cause problems in healthy people, but can cause problems in a hospital is full of sick patients! Aspergillus and other fungal organisms can cause illness and even death in people with certain medical conditions such as transplant patients, cancer treatment patients and patients with lung problems or poor immunity. Therefore, it is critical that you do your part to keep our patients, employees and visitors as safe and healthy as possible. We, in turn, will make conditions as safe as possible for you.

1. Medical Waste

a. We will remove any medical waste, including sharps containers (for used needles and syringes), from construction areas prior to the start of projects.

b. If you (contract workers) find any needles, syringes or sharp medical objects, please notify your supervisor and the Infection Control Nurse (X) *immediately*.

2. Barrier Walls

The construction areas *must* be kept separate from patient care areas by barriers that keep the dust and dirt inside the worksite. The walls must provide a complete seal of the construction area from adjacent areas (walls may be rigid or 4 - 6 mil thickness plastic).

3. Environmental Control

a. Negative air pressure must be maintained within the construction area.

b. Demolition debris must be removed in tightly fitted covered carts. Use specified traffic patterns.

c. Sticky or walk-off mats are placed immediately outside the construction zone and changed whenever necessary to control the spread of dust and dirt.

d. Exterior window seals are to be used to reduce the amount of outside excavation debris coming into the building.

e. If demolition chutes are used, they must be sealed when not in use. The chute and damper should be sprayed with water, as necessary, to maintain dust control.

f. Control, collection and disposal must be provided for any drain liquid or sludge found when demolishing plumbing.

4. Traffic Control

a. Use designated entry and exit procedures.

b. Keep all egress pathways free of debris.

c. No unauthorized personnel should be allowed to enter construction areas.

d. Use designated elevators only.

5. Cleaning

a. Keep the construction area clean on a *daily* basis.

b. Dust and dirt *must* be kept to a minimum.

6. Workers

a. Clothing must be free of loose soil and debris when exiting the construction area.

b. Use personal protective equipment (masks, face shields, etc.) as indicated for the task at hand.

c. Handwashing is the best method of reducing the transmission of infection. Always wash your hands with soap and water after visiting the restroom, before eating or smoking, and when leaving the construction site.

Questions? Please feel free to call the Infection Control Nurse, Ext. xxxx

Infection Control Construction Permit

Construction Class:	
Project Name and Number:	**Permit #:**
Location of Construction:	
COR:	**Telephone:**
Contractor Performing Work:	
Supervisor:	**Telephone:**
CLASS I	1. Obtain approval from COR before activities begin 2. Work performed is limited to inspections and minor installations 3. Execute work by methods to minimize raising dust from inspection operations 4. Permit does not need to be posted for this classification.
CLASS II	1. Obtain and post infection control permit at work location before work begins 2. Provide active means to prevent air borne dust from dispersing into atmosphere 3. Place dust mat at entrances and exits of work sites 4. Tools and equipment must be cleaned prior to entrance to the medical center 5. Isolate HVAC and seal unused doors with duct tape 6. Contain construction waste before transport in tightly covered containers
CLASS III	1. Obtain and post infection control permit at work location before work begins 2. Follow all requirements listed for Class II in addition to requirements listed below

	3. Isolate supply and return ductwork to prevent contamination of system. 4. Complete all critical dust barriers as well as the creation of an anti-room where required for inspection by COR before work begins. 5. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 6. Construct antiroom where required by COR and I.C. Nurse 7. Obtain COR approval before construction and removal of any dust partitions 8. Include paticle count readings on daily logs against baseline points as required by COR or I.C. Nurse.

CLASS IV	1. Obtain and post infection control permit at work location before work begins 2. Follow all requirements listed for Class III in addition to requirements listed below 3. Workers are required to wear clean suites on site 4. All personnel entering and leaving work site must be vacuumed using a HEPA filter vacuum cleaner. 5. This class of permit will require additional specialized precautions unique to each activity which will be listed below
☐ **PPDs Required** ☐ **Additional Requirements:**	
Infection Control Nurse:	**Date:**
COR:	**Date:**
Contractor:	**Date:**

Infection Control Construction Inspection Form

Construction Location/Project #:					PI Infection Control:
Contractor:	Phone:				COR:
Type of Construction:	A	B	C	D	
Patient Risk Group:	Low	Medium	High	Highest	
Class of Precautions:	I	II	III	IV	

		Comments
Class I, II, III, IV		
1. Methods in place to minimize dust raising.		
2. Appropriate signage on doors to construction area.		
3. Appropriate debris transport, i.e., covered cart, dedicated elevator, dedicated route, etc.		
4. Area cleaned at end of the day/trash to designated area.		
5. No visible signs of mice, insects, birds or other vermin.		
6. Roof protection in place for projects on roof.		
7. Displaced ceiling tiles immediately replaced.		
8. Traffic pattern discourages patient exposure.		
9. Water disruptions, if needed, are scheduled during low activity.		
Class II, III, IV		
10. Barrier is solid and airflow goes from clean to dirty.		
11. Surfaces water-misted to control dust while cutting.		
12. Unused doors sealed with duct tape.		

13. Air vents blocked off and sealed.		
14. Walk off mats at work areas kept wet throughout the day.		
15. Floors not showing visible track dirt outside construction area.		
16. HVAC system for this area is sealed or isolated.		
Class III, IV		
17. Critical barriers to seal area in place before beginning.		
18. Negative air pressure maintained with HEPA equipped units.		
19. Waste contained in tightly covered containers.		
20. Transport carts sealed with tape if not a solid lid.		

Class IV		
21. Patients relocated away from construction area.		
22. HVAC system for this area is isolated.		
23. Holes, pipes, conduits and punctures are sealed appropriately.		
24. Anteroom present and all personnel are required to pass through and be vacuumed with HEPA vacuum prior to leaving the site *or* they wear cloth or paper coveralls that are removed each time they leave the site.		
25. Barriers in place until final inspection by Safety and Infection Control and cleaning by ECS.		
Initials:		

SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.1 DESCRIPTION

This section administrative and procedural requirements for deduct alternates.

1.2 DEFINITIONS

A. Deduct Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Deduct Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The credit for each deduct alternate is the net deduction from the Contract Sum to incorporate the deduct alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the deduct alternate into Project.

1. Include as part of each deduct alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of the deduct alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each deduct alternate. Indicate if deduct alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to deduct alternates.

C. Execute accepted deduct alternates under the same conditions as other work of the Contract.

D. Schedule: Refer to Specification 01 00 00, Paragraph 1.3 for a list of Alternates.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

- - - E N D - - -

SECTION 01 32 16.13
NETWORK ANALYSIS SCHEDULES

PART 1- GENERAL

1.1 DESCRIPTION:

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

B. Contractor shall not perform any work onsite until the NAS associated with that work is first approved by the VA.

1.2 CONTRACTOR'S REPRESENTATIVE:

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

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

1.3 CONTRACTOR'S CONSULTANT:

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

B. Prior to engaging a consultant, and within 10 calendar days after award of the contract, the Contractor shall submit to the Contracting Officer:

1. The name and address of the proposed consultant.
2. Sufficient information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.

3. A list of prior construction projects, along with selected PDM network diagram samples on current projects which the proposed consultant has performed complete project scheduling services. These network diagram samples must show complete project planning for a project of similar size and scope as covered under this contract.

C. The Contracting Officer has the right to approve or disapprove employment of the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of information. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor must have their CPM Consultant approved prior to submitting any diagram.

1.4 COMPUTER PRODUCED SCHEDULES

A. The contractor shall provide to the COR, monthly computer processing of all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of Primavera (P3 or P6) to the COR; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data in Primavera (P3 or P6) batch format; and the resulting monthly updated schedule in a compressed electronic file in Primavera (P3 or P6), (PDM) format. These must be submitted with and substantively support the contractor’s monthly payment request and the signed lookahead report. The COR shall identify the five different report formats that the contractor shall provide based upon the monthly schedule updates.

B. The contractor is responsible for the correctness and timeliness of the computer-produced reports. The Contractor is also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.

C. The VA shall report errors in computer-produced reports to the Contractor’s representative within ten calendar days from receipt of reports. The Contractor will reprocess the computer-produced reports and associated compact disk(s), when requested by the COR, to correct errors which affect the payment and schedule for the project.

1.5 THE COMPLETE PROJECT NETWORK DIAGRAM SUBMITTAL

A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the complete network diagram on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in a compressed

Primavera (P3 or P6), (PDM) format. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, duration, predecessor and successor relationships, trade code, area code, description, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start and start-to-start without lead or lag constraints. The lead or lag for the SS relationships may only be allowed in limited basis if justified in writing and must be approved by the Contracting Officer. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer’s written approval before incorporating them into the network diagram. The Contracting Officer’s separate approval of the network diagram shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have a zero duration. The complete working network diagram shall reflect the Contractor's approach to scheduling the complete project. **The final network diagram in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents.** These changes/delays shall be entered at the first update after the final network diagram has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

B. Within 30 calendar days after receipt of the complete project network diagram, the Contracting Officer or his representative, will do one or both of the following:
   1. Notify the Contractor concerning his actions, opinions, and objections.
   2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint

review, the Contractor shall revise and shall submit three blue line copies of the revised network diagram, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.

C. The approved baseline network diagram schedule and the corresponding computer-produced schedule(s) shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.

D. The Complete Project Network Diagram will contain all pertinent work activities/events.

1.6 WORK ACTIVITY/EVENT COST DATA

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

B. The Contractor shall cost load work activities/events, test, balance and adjust various systems in accordance with the provisions in the FAR 52.232 – 5 (PAYMENTS UNDER FIXED-PRICE CONSTRUCTION), Article, and VAAR 852.236 - 83(PAYMENTS UNDER FIXED-PRICE CONSTRUCTION).

C. The Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.

D. The Contractor shall cost load work activities/events for ASBESTOS ABATEMENT. The sum of asbestos abatement work activity/event costs shall equal the value of the asbestos abatement in the Contractors' bid.

E. The Contractor shall cost load work activities/events for all BID ITEMS. The sum of the cost loading for each bid item work activities/events shall equal the value of the item in the Contractors' bid.

F. Work activities/events for Contractor bond shall have a trade code and area code of BOND.

1.7 NETWORK DIAGRAM REQUIREMENTS

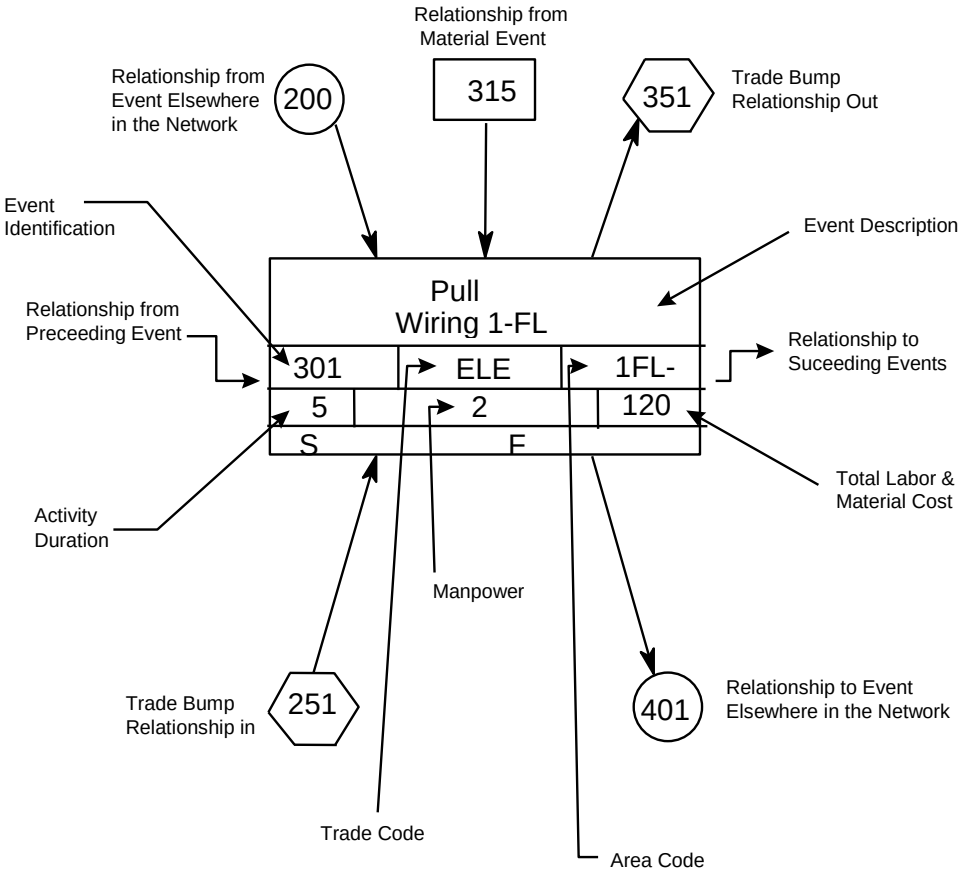
A. Show on the network diagram the sequence and interdependence of work activities/events required for complete performance of all items of work. In preparing the network diagram, the Contractor shall:

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

preparing final network diagrams.

SYMBOL LEGEND

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



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

e. **Commissioning Activities** – Based upon the project specific Commissioning plan and the specification section 01 91 00, the contractor shall include in the **Day 1 CPM Diagram all the systems commissioning activities (see systems covered in Division 7, 8, 21, 22, 23, 26, 27, 28 and others as specified)** such as start up, Pre-functional check list, Pre –test, individual component and system level Functional test, Operator's training, O.& M. Manuals etc.(including any deficiency correction and re-testing). **The majority of commissioning activities should be completed as part of the normal construction schedule and finalized prior to the construction contract completion date.** To this end, it is imperative that the Commissioning Agent and the Contractor collaborate to integrate commissioning activities into the Contractor's overall construction schedule. All commissioning activities shall be cost loaded as required in the earlier paragraphs.

f. The Commissioning Plan will identify critical commissioning activities and associated construction/start up tasks that must precede these activities to allow for successful execution of the commissioning activities. In order to coordinate these activities with the construction schedule, a **Commissioning Duration Schedule s**hould be provided by the Commissioning Agent to the VA RE and the Contractor to provide a rational basis for integration of commissioning into the Day 1 diagram and the construction schedule. The Commissioning Duration Schedule should include the following information:
   1) Description of Commissioning Activity
   2) Prerequisite Construction Tasks Required to Execute the Cx Activity
   3) Elapsed Time Duration of Each Activity
   4) Documentation Associated with Each Task/Document Responsibility

g. Once the duration schedule is delivered to the Contractor, the Commissioning Agent will collaborate with the Contractor to integrate all commissioning activities into the fixed duration construction schedule in accordance with VA NAS requirements for scheduling the project.

h. 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. Schedule these activities/events

so that only one phase is scheduled for completion within the same 30 consecutive calendar day period (except for those phases immediately preceding the final acceptance). Maintain this scheduling condition throughout the length of the contract unless waived by the Contracting Officer’s representative in writing.

i. Bid items other than the Base Bid (ITEM 1) shall have trade codes corresponding to the appropriate bid item number (e.g., ITM 3, ITM 4 and other items).

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

B. Submit the following supporting data in addition to the network diagram, activity/event ID schedule and electronic file (s). Failure of the Contractor to include this data will delay the review of the submittal until the Contracting Officer is in receipt of the missing data:

1. The proposed number of working days per week.
2. The holidays to be observed during the life of the contract (by day, month, and year).
3. The planned number of shifts per day.

4. The number of hours per shift.
5. List the major construction equipment to be used on the site, describing how each piece relates to and will be used in support of the submitted network diagram work activities/events.
6. Provide a typed, doubled spaced, description, at least one page in length, of the plan and your approach to constructing the project.

C. To the extent that the network diagram or any revised network diagram shows anything not jointly agreed upon, it shall not be deemed to have been approved by the Contracting Officer. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the Contracting Officer's approval of the network diagram.

D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA (COR) an electronic file(s) containing one file of the data required to produce a Primavera (P3 or P6), (PDM) produced schedule, reflecting all the activities/events of the complete project network diagram being submitted.

1.8 PAYMENT TO THE CONTRACTOR:

A. Monthly, the contractor shall submit the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article FAR 52.232 – 5 (PAYMENTS UNDER FIXED-PRICE CONSTRUCTION), and VAAR 852.236 - 83(PAYMENTS UNDER FIXED-PRICE CONSTRUCTION). The Contractor is entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated computer-produced calendar-dated schedule unless, in special situations, the Contracting Officer permits an exception to this requirement. Monthly payment requests shall include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of Primavera (P3 or P6), (PDM) to the COR; a listing of all project schedule changes, and associated data, made at the update; and an electronic file (s) of the resulting monthly updated schedule in a compressed Primavera (P3 or P6), (PDM) format. These must be submitted with and substantively support the contractor’s monthly application and certificate for payment request documents.

B. When the Contractor fails or refuses to furnish to the Contracting Officer the information and the associated updated Primavera (P3 or P6),

(PDM) schedule in electronic format, which, in the sole judgment of the Contracting Officer, is necessary for processing the monthly progress payment, the Contractor shall not be deemed to have provided an estimate and supporting schedule data upon which progress payment may be made.

1.9 PAYMENT AND PROGRESS REPORTING

A. Bi-monthly job site progress meetings shall be held on dates mutually agreed to by the COR and the Contractor. Contractor and the CPM consultant will be required to attend all bi-monthly progress meetings. Presence of Subcontractors during progress meeting is optional unless required by the COR. The Contractor shall update the project schedule and all other data required by this section shall be accurately filled in and completed prior to the monthly progress meeting. The Contractor shall provide this information to the COR in completed form three work days in advance of the progress meeting. Job progress will be reviewed to verify:

1. Actual start and/or finish dates for updated/completed activities/events.
2. Remaining duration, required to complete each activity/event started, or scheduled to start, but not completed.
3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the network diagram and computer-produced schedules. Changes in activity/event sequence and duration which have been made pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
4. Percentage for completed and partially completed activities/events.
5. Logic and duration revisions required by this section of the specifications.
6. Activity/event duration and percent complete shall be updated independently.

B. The Contractor shall submit a narrative report as a part of his bi-monthly review and update, in a form agreed upon by the Contractor and the COR. The narrative report shall include a description of problem areas; current and anticipated delaying factors and their estimated impact on performance of other activities/events and completion dates; and an explanation of corrective action taken or proposed. This report is in addition to the daily reports pursuant to the provisions of Article, DAILY REPORT OF WORKERS AND MATERIALS in the GENERAL CONDITIONS.

C. After completion of the joint review and the Contracting Officer's approval of all entries, the contractor will generate an updated

computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.

D. After completing the monthly schedule update, the contractor's scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and COR for the contract change(s). When there is a disagreement on logic and/or durations, the consultant shall use the schedule logic and/or durations provided and approved by the COR. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the COR within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.**

E. After VA acceptance and approval of the final network diagram, and after each monthly update, the contractor shall submit to the Contracting Officer three blue line copies of a revised complete network diagram showing all completed and partially completed activities/events, contract changes and logic changes made on the intervening updates or at the first update on the final diagram. The Contracting Officer may elect to have the contractor do this on a less frequent basis, but it shall be done on a quarterly basis as a minimum.

F. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and

administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

1.10 RESPONSIBILITY FOR COMPLETION

A. Whenever it becomes apparent from the current monthly progress review meeting or the monthly computer-produced calendar-dated schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
   1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
   2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
   3. Reschedule the work in conformance with the specification requirements.

B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the Contracting Officer for the proposed schedule changes. If such actions are approved, the CPM revisions shall be incorporated by the Contractor into the network diagram before the next update, at no additional cost to the Government.

1.11 CHANGES TO NETWORK DIAGRAM AND SCHEDULE

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

3. The schedule does not represent the actual prosecution and progress of the project.
4. When there is, or has been, a substantial revision to the activity/event costs of the network diagram regardless of the cause for these revisions.

B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Medical Center, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, must be furnished in writing to the Contracting Officer for approval.

C. Contracting Officer's approval for the revised network diagram and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.

D. The cost of revisions to the network diagram resulting from contract changes will be included in the proposal for changes in work as specified in Article, FAR 52.243 -4 (CHANGES), VAAR 852.236 – 88 (CHANGES – SUPPLEMENTS), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.

E. The cost of revisions to the network diagram not resulting from contract changes is the responsibility of the Contractor.

1.12 ADJUSTMENT OF CONTRACT COMPLETION

A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the Contracting Officer may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.

B. Actual delays in activities/events which, according to the computer-produced calendar-dated schedule, do not affect the extended

and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.

C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under Article, FAR 52.243 -4 (CHANGES), VAAR 852.236 – 88 (CHANGES – SUPPLEMENTS). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.

D. All delays due to non-work activities/events such as RFI’s, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

1.13 CONSTRUCTION SCHEDULE RISK ANALYSIS / MITIGATION PLAN

A. Schedule Risk Analysis – The contractor shall conduct the statistical schedule risk analysis based on the above detailed construction activities in the Day 1 approved diagram, identifying major schedule risk areas and recommended risk mitigation plans as outlined below.

B. The risk analysis shall be conducted by a person or firm skilled in the statistical method of schedule risk analysis based on the (PDM) network techniques for major construction projects, preferably in the major health care related projects. The cost of this service shall be included in the Contractor's proposal.

C. The Contracting Officer has the right to approve or disapprove the Person or firm designated to perform the risk analysis.

1.14 RISK ANALYSIS FORMAT / REQUIREMENTS / SUBMITTALS

A. Risk Analysis Software / Format - Within 45 calendar days (60 calendar days on projects over $50,000,000) after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; a Risk Analysis software to be utilized, the method of performing the analysis, the format of presenting the data and the reports for VA approval.

B. Conduct Risk Analysis **/ Submittals - Based on the approved software / format, the consultant shall** perform statistical risk analysis on the detailed approved Day 1 diagram. The contractor shall review and utilize any previous Risk analysis performed by the A/E of record based on the “semi-detailed” (yet at an overall level) construction logic and

schedule to ensure the continuity of previous schedule risk analysis. The contractor's project manager and Superintendent shall identify the major schedule risk areas and possible risk mitigation strategy/plan and record it in a narrative format, with **electronic file submission** to the VA. **The risk analysis exercise shall be performed or updated at least on a quarterly basis or as directed by the VA Contracting officer.**

C. The submittal shall include three copies of a computer-produced risk analysis results, predicting the various meaningful probability curves of achieving the contract schedules. It shall also include a detailed narrative list of all major and minor potential and specific schedule and cost risk areas, and a contractor's recommendations of mitigating the identified risks which must be addressed by the VA Project and COR teams to maintain the contract schedule.

- - - E N D - - -

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, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.

1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:

A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.

1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.

1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by COR on behalf of the Contracting Officer.

1-6. Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price

and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.

1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.

1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.

A. Submit samples required by individual specification sections, in quadruplicate, except where a greater number is required. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified. Electronic submittal of samples is not permitted.

B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail or electronically and shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.

1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.

C. 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.

D. Approved samples will be kept on file by the COR 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.

E. 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. If submittal drawings are not submitted electronically, comply with the following requirements:

1. For each drawing required, submit one legible photographic paper or vellum reproducible.
2. Reproducible shall be full size.
3. Each drawing shall have marked thereon, proper descriptive title, including 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, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.

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

1-10. Samples, shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to:

René Niemoller
Perspectus Architecture
13212 Shaker Square, Suite 204
Cleveland, Ohio 44120
rniemoller@perspectusarch.com

1-11. At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the COR.

- - - E N D - - -

SECTION 01 35 26
SAFETY REQUIREMENTS

1.1 APPLICABLE PUBLICATIONS:

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

B. American Society of Safety Engineers (ASSE):

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

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

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

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

E84-2013.....Surface Burning Characteristics of Building Materials

D. The Facilities Guidelines Institute (FGI):

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

E. National Fire Protection Association (NFPA):

10-2013.....Standard for Portable Fire Extinguishers

30-2012.....Flammable and Combustible Liquids Code

51B-2014.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work

70-2014.....National Electrical Code

70B-2013.....Recommended Practice for Electrical Equipment Maintenance

70E-2012 .....Standard for Electrical Safety in the Workplace

99-2012.....Health Care Facilities Code

241-2013.....Standard for Safeguarding Construction, Alteration, and Demolition Operations

F. The Joint Commission (TJC)

TJC Manual .....Comprehensive Accreditation and Certification Manual

G. U.S. Nuclear Regulatory Commission

10 CFR 20 .....Standards for Protection Against Radiation

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

29 CFR 1904 .....Reporting and Recording Injuries & Illnesses

29 CFR 1910 .....Safety and Health Regulations for General Industry

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

CPL 2-0.124.....Multi-Employer Citation Policy

I. VHA Directive 2005-007

1.2 DEFINITIONS:

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

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

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

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

E. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:

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

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

3. Restricted work;

4. Transfer to another job;

5. Medical treatment beyond first aid;

6. Loss of consciousness; or

7. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

1.3 REGULATORY REQUIREMENTS:

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

1.4 ACCIDENT PREVENTION PLAN (APP):

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

B. The APP shall be prepared as follows:

1. Written in English by a qualified person who is employed by the Prime Contractor articulating the specific work and hazards pertaining to the contract (model language can be found in ASSE A10.33). Specifically articulating the safety requirements found within these VA contract safety specifications.

2. Address both the Prime Contractors and the subcontractors work operations.

3. State measures to be taken to control hazards associated with materials, services, or equipment provided by suppliers.

4. Address all the elements/sub-elements and in order as follows:

a. **SIGNATURE SHEET.** Title, signature, and phone number of the following:

1) Plan preparer (Qualified Person such as corporate safety staff person or contracted Certified Safety Professional with construction safety experience);

2) Plan approver (company/corporate officers authorized to obligate the company);

3) Plan concurrence (e.g., Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional). Provide concurrence of other applicable corporate and project personnel (Contractor).

b. **BACKGROUND INFORMATION.** List the following:

1) Contractor;

2) Contract number;

3) Project name;

4) Brief project description, description of work to be performed, and location; phases of work anticipated (these will require an AHA).

c. **STATEMENT OF SAFETY AND HEALTH POLICY.** Provide a copy of current corporate/company Safety and Health Policy Statement, detailing commitment to providing a safe and healthful workplace for all employees. The Contractor's written safety program goals, objectives, and accident experience goals for this contract should be provided.

d. **RESPONSIBILITIES AND LINES OF AUTHORITIES.** Provide the following:

1) A statement of the employer's ultimate responsibility for the implementation of his SOH program;

2) Identification and accountability of personnel responsible for safety at both corporate and project level. Contracts specifically requiring safety or industrial hygiene personnel shall include a copy of their resumes.

3) The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA Competent/Qualified Person(s) requirements must be attached.;

4) Requirements that no work shall be performed unless a designated competent person is present on the job site;

5) Requirements for pre-task Activity Hazard Analysis (AHAs);

6) Lines of authority;

7) Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified;

e. SUBCONTRACTORS AND SUPPLIERS. If applicable, provide procedures for coordinating SOH activities with other employers on the job site:

1) Identification of subcontractors and suppliers (if known);

2) Safety responsibilities of subcontractors and suppliers.

f. **TRAINING.**

1) Site-specific SOH orientation training at the time of initial hire or assignment to the project for every employee before working on the project site is required.

2) Mandatory training and certifications that are applicable to this project (e.g., explosive actuated tools, crane operator, rigger, crane signal person, fall protection, electrical lockout/NFPA 70E, machine/equipment lockout, confined space, etc…) and any requirements for periodic retraining/recertification are required.

3) Procedures for ongoing safety and health training for supervisors and employees shall be established to address changes in site hazards/conditions.

4) OSHA 10-hour training is required for all workers on site and the OSHA 30-hour training is required for Trade Competent Persons (CPs)

g. SAFETY AND HEALTH INSPECTIONS.

1) Specific assignment of responsibilities for a minimum daily job site safety and health inspection during periods of work activity: Who will conduct (e.g., "Site Safety and Health CP"), proof of inspector's training/qualifications, when

inspections will be conducted, procedures for documentation, deficiency tracking system, and follow-up procedures.

2) Any external inspections/certifications that may be required (e.g., contracted CSP or CSHT)

h. **ACCIDENT INVESTIGATION & REPORTING.** The Contractor shall conduct mishap investigations of all OSHA Recordable Incidents. The APP shall include accident/incident investigation procedure & identify person(s) responsible to provide the following to the COR or Government Designated Authority:

1) Exposure data (man-hours worked);

2) Accident investigations, reports, and logs.

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

1) Emergency response;

2) Contingency for severe weather;

3) Fire Prevention;

4) Medical Support;

5) Posting of emergency telephone numbers;

6) Prevention of alcohol and drug abuse;

7) Site sanitation (housekeeping, drinking water, toilets);

8) Night operations and lighting;

9) Hazard communication program;

10) Welding/Cutting “Hot” work;

11) Electrical Safe Work Practices (Electrical LOTO/NFPA 70E);

12) General Electrical Safety

13) Hazardous energy control (Machine LOTO);

14) Site-Specific Fall Protection & Prevention;

15) Excavation/trenching;

16) Asbestos abatement;

17) Lead abatement;

18) Crane critical lift;

19) Respiratory protection;

20) Health hazard control program;

21) Radiation Safety Program;

22) Abrasive blasting;

23) Heat/Cold Stress Monitoring;

24) Crystalline Silica Monitoring (Assessment);

25) Demolition plan (to include engineering survey);

26) Formwork and shoring erection and removal;

27) PreCast Concrete.

C. Submit the APP to the COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES within 14 calendar days of the receipt of the Notice to Proceed. Work cannot proceed without an accepted APP.

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

E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the COR, project superintendent, project overall designated OSHA Competent Person, and the facility Safety Officer. Should any severe hazard exposure, i.e. imminent danger,

become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34) and the environment.

F. Reference sample AAP at the conclusion of this Section.

1.5 ACTIVITY HAZARD ANALYSES (AHAS):

A. AHAs are also known as Job Hazard Analyses, Job Safety Analyses, and Activity Safety Analyses. Before beginning each work activity involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or sub-contractor is to perform the work, the Contractor(s) performing that work activity shall prepare an AHA (Example electronic AHA forms can be found on the US Army Corps of Engineers web site)

B. AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.

C. Work shall not begin until the AHA for the work activity has been accepted by the COR and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.

1. The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by OSHA and/or other State and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.

2. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).

a. If more than one Competent/Qualified Person is used on the AHA activity, a list of names shall be submitted as an attachment to the AHA. Those listed must be Competent/Qualified for the type of work involved in the AHA and familiar with current site safety issues.

b. If a new Competent/Qualified Person (not on the original list) is added, the list shall be updated (an administrative action not requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.

3. Submit AHAs to the COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES for review within 14 calendar days of the receipt of the Notice to Proceed and at least 14 calendar days prior to the start of each phase after the first phase. Subsequent AHAs shall be formatted as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

4. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

5. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and then submitted to the COR.

1.6 PRECONSTRUCTION CONFERENCE:

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

B. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.

C. Deficiencies in the submitted APP will be brought to the attention of the Contractor, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

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

A. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the SSHO to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a CP to administer their individual safety programs.

B. Further, all specialized Competent Persons for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).

C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).

D. The SSHO or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. CPs will maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated

SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.

E. The repeated presence of uncontrolled hazards during a contractor's work operations will result in the designated CP as being deemed incompetent and result in the required removal of the employee in accordance with FAR Clause 52.236-5: Material and Workmanship, Paragraph (c).

1.8 TRAINING:

A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.

B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.

C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.

D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.

E. Submit training records associated with the above training requirements to the COR for review for compliance with contract requirements in

accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 14 calendar days prior to the date of the preconstruction conference for acceptance.

F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures, accident reporting etc... Documentation shall be provided to the COR that individuals have undergone contractor's safety briefing.

G. Ongoing safety training will be accomplished in the form of weekly documented safety meeting.

1.9 INSPECTIONS:

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

B. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT will provide their certificate number on the required report for verification as necessary.

1. Results of the inspection will be documented with tracking of the identified hazards to abatement.

2. The COR will be notified immediately prior to start of the inspection and invited to accompany the inspection.

3. Identified hazard and controls will be discussed to come to a mutual understanding to ensure abatement and prevent future reoccurrence.

4. A report of the inspection findings with status of abatement will be provided to the COR within one week of the onsite inspection.

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

A. Notify the COR as soon as practical, but no more than four hours after any accident meeting the definition of OSHA Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $5,000, or any weight handling equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the COR determines whether a government investigation will be conducted.

B. Conduct an accident investigation for recordable injuries and illnesses, for Medical Treatment defined in paragraph DEFINITIONS, and property damage accidents resulting in at least $20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162, and provide the report to the COR within 7 calendar days of the accident. The COR will provide copies of any required or special forms.

C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month will be reported to the COR monthly.

D. A summation of all OSHA recordable accidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the COR monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the COR as requested.

1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE):

A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on

electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.

B. Mandatory PPE includes:

1. Hard Hats – unless written authorization is given by the COR, except in circumstances of work operations that have limited potential for falling object hazards such as during finishing work or minor remodeling. With authorization to relax the requirement of hard hats, if a worker becomes exposed to an overhead falling object hazard, then hard hats would be required in accordance with the OSHA regulations.

2. Safety glasses - unless written authorization is given by the COR, appropriate safety glasses meeting the ANSI Z.87.1 standard must be worn by each person on site.

3. Appropriate Safety Shoes – based on the hazards present, safety shoes meeting the requirements of ASTM F2413-11 shall be worn by each person on site unless written authorization is given by the COR.

4. Hearing protection - Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks.

1.12 INFECTION CONTROL

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

B. An AHA associated with infection control will be performed by VA personnel in accordance with FGI Guidelines (i.e. Infection Control Risk Assessment (ICRA)). The ICRA procedure found on the American Society for Healthcare Engineering (ASHE) website will be utilized. Risk classifications of Class II or lower will require approval by the COR before beginning any construction work. Risk classifications of Class III or higher will require a permit before beginning any construction work. Infection Control permits will be issued by the COR.

The Infection Control Permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if the work is located in separate areas requiring separate classes. The primary project scope area for this project will be determined by the Infection Control Risk Assessment Team, however, work outside the primary project scope area may vary. The required infection control precautions with each class are as follows:

1. Class I requirements:

   a. During Construction Work:

      1) Notify the COR.

      2) Execute work by methods to minimize raising dust from construction operations.

      3) Ceiling tiles: Immediately replace a ceiling tiles displaced for visual inspection.

   b. Upon Completion:

      1) Clean work area upon completion of task.

      2) Notify the COR.

2. Class II requirements:

   a. During Construction Work:

      1) Notify the COR.

      2) Provide active means to prevent airborne dust from dispersing into atmosphere such as wet methods or tool mounted dust collectors where possible.

      3) Water mist work surfaces to control dust while cutting.

      4) Seal unused doors with duct tape.

      5) Block off and seal air vents.

      6) Remove or isolate HVAC system in areas where work is being performed.

b. Upon Completion:

1) Wipe work surfaces with cleaner/disinfectant.

2) Contain construction waste before transport in tightly covered containers.

3) Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.

4) Upon completion, restore HVAC system where work was performed

5) Notify the COR.

3. Class III requirements:

a. During Construction Work:

1) Obtain permit from the COR.

2) Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.

3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.

4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.

5) Contain construction waste before transport in tightly covered containers.

6) Cover transport receptacles or carts. Tape covering unless solid lid.

b. Upon Completion:

1) Do not remove barriers from work area until completed project is inspected by the COR and thoroughly cleaned by the VA Environmental Services Department.

2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.

3) Vacuum work area with HEPA filtered vacuums.

4) Wet mop area with cleaner/disinfectant.

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

6) Return permit to the COR.

4. Class IV requirements:

a. During Construction Work:

1) Obtain permit from the COR.

2) Isolate HVAC system in area where work is being done to prevent contamination of duct system.

3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.

4) Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.

5) Seal holes, pipes, conduits, and punctures.

6) Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site.

7) All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.

b. Upon Completion:

1) Do not remove barriers from work area until completed project is inspected by the COR with thorough cleaning by the VA Environmental Services Dept.

2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.

3) Contain construction waste before transport in tightly covered containers.

4) Cover transport receptacles or carts. Tape covering unless solid lid.

5) Vacuum work area with HEPA filtered vacuums.

6) Wet mop area with cleaner/disinfectant.

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

8) Return permit to the COR

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

1. Class III and IV - closed door with masking tape applied over the frame and door is acceptable for projects that can be contained in a single room.

2. Construction, demolition or reconstruction not capable of containment within a single room must have the following barriers erected and made presentable on hospital occupied side:

a. Class III & IV (where dust control is the only hazard, and an agreement is reached with the COR and Medical Center) - Airtight plastic barrier that extends from the floor to ceiling. Seams

must be sealed with duct tape to prevent dust and debris from escaping.

b. Class III & IV - Drywall barrier erected with joints covered or sealed to prevent dust and debris from escaping.

c. Class III & IV - Seal all penetrations in existing barrier airtight.

d. Class III & IV - Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement air and debris.

e. Class IV only - Anteroom or double entrance openings that allow workers to remove protective clothing or vacuum off existing clothing.

f. Class III & IV - At elevators shafts or stairways within the field of construction, overlapping flap minimum of two feet wide of polyethylene enclosures for personnel access.

D. Products and Materials:

1. Sheet Plastic: Fire retardant polystyrene, 6-mil thickness meeting local fire codes.

2. Barrier Doors: Self Closing solid core wood in steel frame, painted.

3. Dust proof fire-rated drywall.

4. High Efficiency Particulate Air-Equipped filtration machine rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Maintenance of equipment and replacement of the HEPA filters and other filters will be in accordance with manufacturer’s instructions.

5. Exhaust Hoses: Heavy duty, flexible steel reinforced; Ventilation Blower Hose.

6. Adhesive Walk-off Mats: Provide minimum size mats of 24 inches x 36 inches.

7. Disinfectant: Hospital-approved disinfectant or equivalent product.

8. Portable Ceiling Access Module.

E. Before any construction on site begins, all contractor personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.

F. A dust control program will be establish and maintained as part of the contractor’s infection preventive measures in accordance with the FGI Guidelines for Design and Construction of Healthcare Facilities. Prior to start of work, prepare a plan detailing project-specific dust protection measures with associated product data, including periodic status reports, and submit to COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

G. Medical Center Infection Control personnel will monitor for airborne disease (e.g. aspergillosis) during construction. A baseline of conditions will be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality with safe thresholds established.

H. In general, the following preventive measures shall be adopted during construction to keep down dust and prevent mold.

1. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. HEPA filtration is required where the exhaust dust may reenter the medical center.

2. Exhaust hoses shall be exhausted so that dust is not reintroduced to the medical center.

3. Adhesive Walk-off/Carpet Walk-off Mats shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.

4. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as it is created. Transport these outside the construction area in containers with tightly fitting lids.

5. The contractor shall not haul debris through patient-care areas without prior approval of the COR and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.

6. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.

7. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.

I. Final Cleanup:

1. Upon completion of project, or as work progresses, remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.

2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.

3. All new air ducts shall be cleaned prior to final inspection.

J. Exterior Construction

1. Contractor shall verify that dust will not be introduced into the medical center through intake vents, or building openings. HEPA filtration on intake vents is required where dust may be introduced.

2. Dust created from disturbance of soil such as from vehicle movement will be wetted with use of a water truck as necessary

3. All cutting, drilling, grinding, sanding, or disturbance of materials shall be accomplished with tools equipped with either local exhaust ventilation (i.e. vacuum systems) or wet suppression controls.

1.13 TUBERCULOSIS SCREENING

A. Contractor shall provide written certification that contract employees assigned to the work site that are determined to be at risk for transmission of TB have had a pre-placement tuberculin screening within 90 days prior to assignment to the worksite and been found to have negative TB screening reactions. Contractors shall be required to show documentation of negative TB screening reactions for any additional workers who are added after the 90-day requirement before they will be allowed to work on the work site. NOTE: This can be the Center for Disease Control (CDC) and Prevention and two-step skin testing or a Food and Drug Administration (FDA)-approved blood test.

1. Contract employees manifesting positive screening reactions to the tuberculin shall be examined according to current CDC guidelines prior to working on VHA property.

2. Subsequently, if the employee is found without evidence of active (infectious) pulmonary TB, a statement documenting examination by a physician shall be on file with the employer (construction contractor), noting that the employee with a positive tuberculin screening test is without evidence of active (infectious) pulmonary TB.

3. If the employee is found with evidence of active (infectious) pulmonary TB, the employee shall require treatment with a subsequent statement to the fact on file with the employer before being allowed to return to work on VHA property.

1.14 FIRE SAFETY

A. Fire Safety Plan: Establish and maintain a site-specific fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to COR and Facility Safety Manager for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. This plan may be an element of the Accident Prevention Plan.

B. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.

C. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).

D. Temporary Construction Partitions:

1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board on the public side and gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on the construction side of fire retardant treated wood or metal steel studs. Gypsum board joints on the public side of the temporary partition shall be taped and finished. The public side of temporary partitions shall be painted. Extend the partitions through suspended ceilings to floor slab deck or roof. At door openings, install Class C, ¾ hour fire/smoke rated doors with self-closing devices and VA locking system (storeroom type lock always locked from the corridor side). Refer to Drawings for additional requirements.

2. Install temporary construction partitions to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.

3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.

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

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

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

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

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

J. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.

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 COR. 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 COR.

L. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with COR.

M. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with COR. Obtain permits from COR at least 48 hours in advance.

N. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to COR.

O. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction.

P. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily. (Refer to Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT for GEMS Policy Requirements.)

Q. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

R. If required, submit documentation to the COR that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

S. See Section 01 00 00, GENERAL REQUIREMENTS for additional OSHA Requirements and Safety and Health Regulations.

1.15 ELECTRICAL

A. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, 29 CFR Part 1910 Subpart J – General Environmental Controls, 29 CFR Part 1910 Subpart S – Electrical, and 29 CFR 1926 Subpart K in addition to other references required by contract.

B. All qualified persons performing electrical work under this contract shall be licensed journeyman or master electricians. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.

C. All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition (refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply

with this requirement is subject to immediate termination in accordance with FAR clause 52.236-5(c). Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The COR with approval of the Medical Center Director will make the determination if the circumstances would meet the exception outlined above. An AHA specific to energized work activities will be developed, reviewed, and accepted prior to the start of that work.

1. Development of a Hazardous Electrical Energy Control Procedure is required prior to de-energization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.

2. Verification of the absence of voltage after de-energization and lockout/tagout is considered "energized electrical work" (live work) under NFPA 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.

3. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the the COR.

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

E. Ground-fault circuit interrupters. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites shall have approved ground-fault circuit interrupters for personnel protection. "Assured Equipment Grounding Conductor Program" only is not allowed.

1.16 FALL PROTECTION

A. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.

1. The use of a Safety Monitoring System (SMS) as a fall protection method is prohibited.

2. The use of Controlled Access Zone (CAZ) as a fall protection method is prohibited.

3. A Warning Line System (WLS) may ONLY be used on floors or flat or low-sloped roofs (between 0 - 18.4 degrees or 4:12 slope) and shall be erected around all sides of the work area (See 29 CFR 1926.502(f) for construction of WLS requirements). Working within the WLS does not require FP. No worker shall be allowed in the area between the roof or floor edge and the WLS without FP. FP is required when working outside the WLS.

4. Fall protection while using a ladder will be governed by the OSHA requirements.

1.17 SCAFFOLDS AND OTHER WORK PLATFORMS

A. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L.

B. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) as stated in Section 1.16.

C. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.

1. Scaffolds, platforms, or temporary floors shall be provided for all work except that can be performed safely from the ground or similar footing.

2. Ladders less than 20 feet may be used as work platforms only when use of small hand tools or handling of light material is involved.

3. Ladder jacks, lean-to, and prop-scaffolds are prohibited.

4. Emergency descent devices shall not be used as working platforms.

D. Contractors shall use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags shall be color-coded: green indicates the scaffold has been inspected and is safe to use; red indicates the scaffold is unsafe to use. Tags shall be readily visible, made of materials that will withstand the environment in which they are used, be legible and shall include:

1. The Competent Person’s name and signature;

2. Dates of initial and last inspections.

E. Mast Climbing work platforms: When access ladders, including masts designed as ladders, exceed 20 ft (6 m) in height, positive fall protection shall be used.

1.18 CRANES

A. All crane work shall comply with 29 CFR 1926 Subpart CC.

B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no “Phase In” date of November 10, 2014.

C. A detailed lift permit shall be submitted 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing. The lift will not be allowed without approval of this document.

D. Crane operators shall not carry loads

1. over the general public or VAMC personnel

2. over any occupied building unless

   a. the top two floors are vacated

   b. or overhead protection with a design live load of 300 psf is provided

1.19 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

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

1.20 CONFINED SPACE ENTRY

A. All confined space entry shall comply with 29 CFR 1910.146 except for specifically referenced operations in 29 CFR 1926 such as excavations/trenches [1926.651(g)].

B. A site-specific Confined Space Entry Plan (including permitting process) shall be developed and submitted to the COR.

1.21 WELDING AND CUTTING

As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with COR. Obtain permits from COR at least 48 hours in advance.

1.22 LADDERS

A. All Ladder use shall comply with 29 CFR 1926 Subpart X.

B. All portable ladders shall be of sufficient length and shall be placed so that workers will not stretch or assume a hazardous position.

C. Manufacturer safety labels shall be in place on ladders.

D. Step Ladders shall not be used in the closed position.

E. Top steps or cap of step ladders shall not be used as a step.

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

1. When a 3 ft (0.9-m) extension is not possible, a grasping device (such as a grab rail) shall be provided to assist workers in mounting and dismounting the ladder.

2. In no case shall the length of the ladder be such that ladder deflection under a load would, by itself, cause the ladder to slip from its support.

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

1.23 FLOOR & WALL OPENINGS

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

B. Floor and roof holes/openings are any that measure over 2 in (51 mm) in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. See 21.F for covering and labeling requirements. Skylights located in floors or roofs are considered floor or roof hole/openings.

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

1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.

2. Covers shall be secured when installed, clearly marked with the word “HOLE”, “COVER” or “Danger, Roof Opening-Do Not Remove” or color-coded or equivalent methods (e.g., red or orange “X”). Workers must be made aware of the meaning for color coding and equivalent methods.

3. Roofing material, such as roofing membrane, insulation or felts, covering or partly covering openings or holes, shall be immediately cut out. No hole or opening shall be left unattended unless covered.

4. Non-load-bearing skylights shall be guarded by a load-bearing skylight screen, cover, or railing system along all exposed sides.

5. Workers are prohibited from standing/walking on skylights.

- - - E N D - - -

(Name) CONSTRUCTION COMPANY

SITE SPECIFIC ACCIDENT PREVENTION PLAN

+

CONSTRUCTION HEALTH AND SAFETY PROGRAM

FOR

ENHANCE MEDICAL, SPECIALTY CARE, AND ADMIN. SERVICES

Veterans Affairs Medical Center – Wade Park

Cleveland, Ohio

Project number given by contracting avoid confusion

PROJECT # 541-15-101

CONTRACT # VA541-<A-XYZ>

RESPONSIBILITIES AND LINES OF AUTHORITY OF <NAME> CONSTRUCTION COMPANY

The following people have responsibilities and authority for corporate safety:

BACKGROUND INFORMATION (Prime)

I. Contractor: **<Name>**
<Address>

<City, State Zip>

II. Project Name: **Wade Park - <Name>**

III. Project Description: **<Brief Description** (541-xx-xxx)>

IV. Contractor Accident Record: **<Contractor provide OSHA Log information>**

A. RESPONSIBILITIES

1. Chief Corporate Safety Officer: **<Contact Name (Contact telephone #)>**

<Name> Construction Company

<Title>

2. Site Safety Responsibilities: **<Contact Name (Contact telephone #)>**

<Name> Construction Company

<Title>

3. Project Safety Consulting: **<Contact Name (Contact telephone #)>**

<Name> Construction Company

<Title>

BACKGROUND INFORMATION (SUBCONTRACTOR)

I. Contractor: **<Name>**

<Address>

<City, State Zip>

II. Project Name: **Wade Park - <Name>**

III. Project Description: **<Brief Description>**

IV. Contractor Accident Record: **<Contractor provide OSHA Log information>**

A. RESPONSIBILITIES

1. Chief Corporate Safety Officer: **<Contact Name (Contact telephone #)>**

<Name> Construction Company

<Title>

2. Site Safety Responsibilities: **<Contact Name (Contact telephone #)>**

<Name> Construction Company

<Title>

3. Project Safety Consulting: **<Contact Name (Contact telephone #)>**

<Name> Construction Company

<Title>

The overall lines of authority concerning safety and health will be as follows:

<Name – Title>

<Name – Title>

A Site Safety and Health Officer will be provided at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor and subcontractors. The SSHO will be employed by the prime. SSHO qualifications with education certificates will be listed in Appendix B.

The competent person for Health Hazard Control and Respiratory Protection Program will conduct and document a hazard assessment in accordance with Section 06 to identify and evaluate. (What form of documentation).

Site Safety and Health Officer (SSHO) shall conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Safety inspection logs shall be attached to the Contractors daily quality control report. Current "Safety Logs" shall be readily available upon request.

SIGNATURE SHEET

The following persons are responsible for preparing and approving this plan:

Preparer:

<Contact Name (Phone #)>

<Contact Title>

<Name> Construction Company

_____

Date_____

SCOPE OF WORK SUMMARY

Summary

This job consists of **<Basic Description> Please include the scope of work submitted for the project**

Pre-demolition:

<Describe the activity in sufficient detail to determine the safety program elements that will be required to be addressed in the body of the procedure – Section 6. Use the PCRA (Pre-Construction Risk Assessment) along with the Scope of Work to determine which elements need to be addressed for the pre-demolition phase.>

Demolition:

<Describe the activity in sufficient detail to determine the safety program elements that will be required to be addressed in the body of the procedure – Section 6. PCRA (Pre-Construction Risk Assessment) along with the Scope of Work to determine which elements need to be addressed for each of the demolition phase.>

Construction:

<Describe the activity in sufficient detail to determine the safety program elements that will be required to be addressed in the body of the procedure Section - 6. PCRA (Pre-Construction Risk Assessment) along with the Scope of Work to determine which elements need to be addressed for the construction phase.>

1. SITE ACCESS:

a) Parking onsite is not provided by the VAMC Cleveland at the Wade Park Facility

b) Access into the facility will be through entrances located close to the work area to avoid patient care areas. The following entrance that will be used by **<Name>** Construction Company employees will be submitted in writing or on the drawings:

<Enter the specific building access to be used>

2. WORK AREA SECURITY:

a) All **<Name>** Construction Company employees will wear company identification badges or those provided by VAMC Cleveland Police Service.

b) Patients, visitors and unauthorized VAMC Cleveland employees will be kept out of work areas using locked doors, barricades and safety postings as appropriate.

3. PLAN FOR PREVENTION OF ALCOHOL AND DRUG ABUSE

<Review – replace with your own company policy if this doesn't work for you>

a) Due to the nature of our work, it is critical that all employees are free from the adverse effects of drugs and/or alcohol. The company is committed to providing a safe workplace for all its employees. The goal of this policy is to maintain a safe and secure work environment that is free from the effects of alcohol and drug abuse.

b) The intent of this policy is to be responsive to the employees health needs by the early recognition and treatment of chemical dependency problems and behavioral/medical disorder, and to support the rights of the company and its employees to work within an alcohol / drug free environment.

c) This policy is not applicable to physician prescribed drugs. Employees on such medication(s), which may adversely affect their job performance, should promptly discuss the matter with their supervisor.

- Failure of the employee to so notify their supervisor can result in disciplinary action including discharge.
- It should be noted that while legal, prescribed drugs could adversely affect the safety of the employee and other employees on the site.
- All **<Name>** Construction employees are drug tested before hiring, periodically, and annually.

4. SITE SAFETY AUDITS (Inspections):

a) INTERNAL INSPECTIONS

The site supervisor, who is the **<Name>** Construction competent person, will conduct the Site Safety and Health inspections. The competent person's certifications are located in Appendix B. **<Put the Certifications in the Appendix B.>** There will two types of safety inspections that will be performed on this job site.

(1) A weekly Safety and Health inspection and report will be conducted by the site supervisor. The inspection forms will document and track the following information:

- Any Violations
- Date of violation
- Nature of violation
- Needed corrective action
- Date of correction
- Name of responsible person(s)

(a) In addition to the above items he will also notify any employee and/or subcontractor in writing of any violations.

(b) This information will be followed up on by the COR or Construction Safety Group, as needed and/or requires immediate attention to the violations. (Should he notify VA of findings?)

(c) All safety inspection forms are reviewed to ensure that all noted corrective actions are within the applicable OSHA and Veterans Affairs Safety and Health Manual guidelines.

(d) This documentation will be kept (readily available?) at the project field office, and will aid in the audits of the Accident Prevention Plan.

(2) The second type of Safety and Health Inspection will be a daily checklist.

(a) This too, will be performed each workday onsite, by the site supervisor.

(b) This documentation will be kept at the project field office, and will aid in the audits of the Accident Prevention Plan. (this too Should be made readily available?)

b) EXTERNAL INSPECTORS/CONSTRUCTION ROUNDS

(1) At various times there may be announced and unannounced visits to the work area of any of the Contracted Construction Projects. They may be visited by

some or all of the members of the Construction Safety Inspection Group.

(2) Prior to the activity of cutting and/or welding, the COR for the Veterans

Affairs will be contacted to assist in scheduling a site inspection and submission for a burn permit.

(3) Prior to any activity including digging and/or excavating, the COR for

the Veterans Affairs will be contacted to assist in scheduling a site inspection and submission for a permit.

(4) Prior to any activity including the renovation and/or penetration of rated

walls, the COR for the Veterans Affairs will be contacted to assist in scheduling a site inspection and submission for a permit.

(5) Prior to any activity including the removal or repair of Asbestos Containing Building Material, the COR for the Veterans Affairs will be contacted to assist in scheduling a site inspection and submission for a permit.

c) INSPECTIONS BY OUTSIDE PARTIES i.e., OSHA, EPA, etc.

(1) Presentation of Credentials - Upon arrival at the work site or facility, the Compliance Officer must display his or her credentials and will ask to meet with the appropriate employer representative.

(2) The contractor must notify the projects COR immediately upon the initial contact of the Compliance Officer's contact.

(3) Opening Conference – During an opening conference, the compliance officer will explain the purpose of the inspection. The contractor's management representative must be prepared to discuss actions that have been taken to demonstrate their company's commitment to the health and safety of employees (e.g. work practices, safety and industrial hygiene standards, safety manuals, training conducted, internal inspections, etc).

(4) An authorized employee representative will be given the opportunity to attend the opening conference and to accompany the compliance officer during the inspection. Employees may also be consulted during the conduct of the inspection. Employees who participate in the inspection, or are consulted by the compliance officer, are protected from discrimination for exercising their safety and health rights under the "Whistle Blowers Act".

(5) A contractor management representative and a VAMC Cleveland Safety representative must accompany the compliance officer during the inspection and keep accurate notes of any actual or possible violations found by the compliance officer. Obvious violations detected by the compliance officer should be corrected on the spot where possible.

(6) It is imperative that existing operations, reports, logs, etc. not be misrepresented to the compliance officer. The penalty for making false statements or representation to OSHA or its compliance officers is a maximum of $10,000 and 6 months imprisonment. In addition, the offending party can be subject to discipline by the company up to and including discharge.

(7) Closing Conference - After the inspection has been conducted, a closing conference will be held between the compliance officer, the employer and employee representatives and VAMC Cleveland. This is the best time, before possible issuance of a citation, to explain the company's position. It is imperative that we question any proposed findings or abatement periods that are unreasonable. Request that any citations be sent to the company with a copy to the VAMC Cleveland safety office.

5. SAFETY TRAINING /EDUCATION:

a) Site orientation training:

All employees on site will be required to attend a Safety Training Orientation at the start of the project, or before they begin work at the job site. The site supervisor, competent person, will conduct the training. Training on the applicable requirements of this Site Specific Training Plan is plan is mandatory and must be documented.

b) Supervisor and employee safety meetings:

The primary site supervisor, who is the competent person (certifications located in Appendix B), will conduct the initial employee site safety orientation. Mandatory safety meetings will be held on a weekly basis. Safety and health topics will vary from week to week on subject matter, utilizing the 29 CFR 1910 and 29 CFR 1926 standards, along with the Veterans Affairs Safety and Health Program and issues raised during construction.

<Place documentation of training sign-in sheets and agenda in Appendix B>

c) Employee training:

<Name> Construction Company employees will be trained, at the site safety orientation on the following topics:

- When PPE is necessary.
- What PPE is necessary and which PPE has been selected for each process the employee operates.
- How to properly put on, take off, adjust, and wear PPE.

6. ACCIDENT REPORTING:

All **<Name>** Construction employees on site will be required to attend an "Accident and Event Reporting" Orientation class at the start of the project, or before they begin work at the job site. The site supervisor, competent person, will conduct the above mentioned training.

a) Accident investigations, reports, and logs:

The project manager and site supervisor will conduct all accident and near miss investigations. The site supervisor will maintain the OSHA 300 log. All documentation will be kept on the job site. Certifications for competent person(s) are located in Appendix B.

b) Immediate notification of major accidents:

Should a major accident occur, the following notifications will take place as soon as any injured person(s) are cared for:

<Contact Name, Title>

<Contact Name, Title>

<Contact Name, Title>

VA Safety Representative: Frank Wunderle

Local Emergency Services:

For Wade Park

Hospital	VA Wade Park Medical Facility 10701 East Blvd. Cleveland, Ohio 44106 Dial 2222 from any VA Phone
Hospital	University Hospitals 11100 Euclid Avenue Cleveland, Ohio 44106 911 / (216) 844-1000
Fire Department	911 / 216-664-6813
Security	Dial 4207 from any VA Phone

For Brecksville

Hospital	VA Brecksville Medical Facility 10000 Brecksville Rd.. Brecksville, Ohio 44141 Dial 2222 from any VA Phone

Hospital	Marymount medical Center 2001 East Royalton Rd. Broadview Hts., Ohio 44147 440.717.5800
Fire Department	911 / 440-526-2640
Security	Dial 4207 from any VA Phone

This listing will be posted in the field office.

c) Accident response plan:

<Name> Construction Company intends to make certain all emergency incidents are handled in a proper and safe manner giving priority to the following:

- Life Safety
- Property Conservation
- Emergency Situation Investigation
- Return to Normal Operations

d) Exposure data / man hours worked:

(1) This section covers the following operations **<Fill in operation/s requiring additional training>** unless the employer can demonstrate that the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards. Example; (a negative impact statement or asbestos abatement)

(2) This information will be maintained by the site supervisor and verified by **<Contact Name>**. A daily log will be maintained of all man hours worked. This information will also be used to determine the final TIR for the project. Any data collected will be submitted to the COR for their report.

7. EMERGENCY RESPONSE PLAN:

This plan covers the actions of all **<Name>** Construction employees. All subcontractors on site will be required to submit for approval, to **<Name>** Construction Company, their own site specific Emergency Response Plan. If not adequate, the subcontractor and their employees must be orientated to the **<Name>** Construction Company's "SITE SPECIFIC EMERGENCY RESPONSE PLAN", before they can begin work at this site.

a) Chemical Safety:

As part of this program, **<Name>** Construction Company will inform subcontractors, or their representatives of the site emergency response procedures and any potential fire, explosion, health, safety, or other hazards.

The following procedures address emergency response as follows:

- Pre-emergency planning and coordination with outside parties:

  VAMC (COR) will receive notification of date to start work, along with MSDS's of all substances brought onto the facility.

- Personal roles, lines of authority, training, and communication:

The personnel utilizing chemicals will contain the substances brought onto the facility. Plumbers will contain and handle all compressed gas cylinders, providing they have been trained and documented.

In the case where a situation occurs that they cannot handle, all employees will be trained on evacuating the area, notifying the on-site supervisor, and workers in the immediate worksite.

- Emergency recognition and prevention:

All workers will, at the safety orientation, be informed of this site-specific emergency response plan and procedures.

All workers will be responsible to recognize hazards and their prevention, practice this at all times on the worksite.

All workers will be responsible to answer question from surveyors about general safety, health, and emergency procedures wherever they are on site.

b) Emergency plan for severe weather:

For the site-specific severe weather conditions that employees may encounter during the project, **<Name>** Construction Company has developed the following procedures. First, **<Name>** Construction Company employees will adhere to all NWS warnings and advisories. For snowfall, the policy for workers is that a Level Three emergency, which is predicted heavy snow fall, or other dangerous weather conditions.

- Safe distances and places of refuge:

All workers at this site will be informed of the designated location of the safe zone. This will also be posted in the field office for all to be reminded of. In the event of an emergency occurrence, and the Local Fire Department, or any other entity is summoned, all workers will report to this zone to be accounted for.

- Site security and control:

In the event of an emergency, workers will notify the site supervisor or project manager of the situation, at that time, workers will report to the safe zone. The site supervisor and/or project manager will notify security and any other applicable authorities. Staying away from the immediate situation and not allowing any unauthorized personnel to enter until proper authorities arrive.

- Evacuation routes and procedures:

Any work will be performed on the interior of the building. Evacuation plans are posted in various locations throughout work area by the VA.

- Decontamination:

This would be required if there is a possibility of a large spill of hazardous material with the potential of contaminating contractor employees. Small spills and personnel contaminations are expected to be cleaned up using the contractors Hazard Communication program and associated MSDS requirements.

c) Medical support:

It will be the duty of all workers onsite, including subcontractors, to immediately report to the site supervisor and/or project manager, COR's any and all emergencies.

The following are items of concern regarding the handling of all medical support requirements:

(1) On site:

- For incidents occurring on site at Wade Park Veterans Affairs Medical Center or Brecksville Veterans Affairs Medical Center; the victim(s) will be stabilized prior to be relocated to another institution.

- For non-emergency support first aid supplies will be kept at the **<Name>** Construction Company field office. All subcontractors will be required to supply properly trained personnel as well as their own first aid supplies.

- All supplies will be subject to our safety inspections. No one will perform first aid or CPR unless properly trained, and verification of certification is on file at the jobsite.

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(2) Off site:

- For the Wade Park location, University Hospital Medical Center is located at 11100 Euclid Avenue (216) 844-1000. For the Brecksville location, Marymount medical Center is located on 2001 East Royalton Rd., Broadview Hts., OH 44147.

- Maps are posted and available for all contractors on site (See Appendix A).

- Emergency medical treatment and first aid:

- Emergency alerting and response procedures:

- It will be the duty of all workers onsite, including subcontractors, to immediately respond to the COR's, Construction Safety Team or Outside Inspectors from governmental agencies or agencies approving accreditation regarding their function during an emergency.

(3) Posting of emergency telephone numbers:

The posting of these Emergency Telephone Numbers will be in the job field office, where all workers will have access to them. All employees and subcontractors will be made aware of these and the location at the safety orientation. The numbers are as follows:

Hospital	Wade Park Veterans Affairs Medical Center
	Dial 2222 from any VA Phone

	University Hospital
	911 / (216) 844-1000
Fire Department	911 / (216) 664-6813
Security	Dial 4207 from any VA Phone

d) Hazard communication program:

This site specific Hazard Communication Plan has been implemented in accordance with 29 CFR 1910.1200.

All areas in which hazardous chemicals will be stored shall have the proper label and/or signs. The MSDS for all chemicals on site will be located in a book labeled MSDS, in the project field office.

The training of employees and subcontractors will be as follows:

- Where to find this program
- What is in this program
- All chemicals on this jobsite
- What is an MSDS
- How to find specific information on an MSDS
- Labeling system
- What area these chemicals are stored in, map indicating
- The proper handling procedures for these chemicals
- Spill/release clean up protocol

Should there be an immediate threat to life or property, the emergency response plan for the installation, which is to be on file at the field office.

It is mandatory that all subcontractors submit, before a new chemical is introduced to the worksite, that the proper MSDS is submitted to the site supervisor/project manager. It will be the responsibility of the site supervisor to inform all employees and subcontractors of the new chemical(s), introduce the MSDS, and the potential hazards of that chemical. The site supervisor and/or project manager will have the responsibility to notify the Contracting Officer / COR of any and all new chemicals brought onto the facility.

Chemical storage areas, if needed, to be located per VA designated location.

e) CORRECTIVE ACTIONS INVOLVING CLEAN-UP OPERATIONS AT SITES COVERED BY THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 (RCRA) AS AMENDED (42 W.S.C. 6901 ET SEQ).

Clean-up operations required by a governmental body, whether Federal, state, local or other involving hazardous substance that are conducted at uncontrolled hazardous waste sites (including, but not limited to, the EPA's National Priority Site List (NPL), state priority site lists, sites recommended for the EPA, NPL, and initial investigations of government identified sites which area conducted before the presence or absence of hazardous substances has been ascertained;

Voluntary clean-up operations at sites recognized by Federal, state, local or other governmental bodies as uncontrolled hazardous waste sites;

Operations involving hazardous waste that area conducted at treatment, storage, disposal (TSD) facilities regulated by 40 CFR Parts 264 and 265 pursuant to RCRA; or by agencies

under agreement with U.S.E.P.A. to implement RCRA regulations; and Emergency response operations for releases of, or substantial threats of releases of, hazardous substances with regard to the location of the hazard.

8. FIRE PREVENTION PLAN:

We at **<Name>** Construction Company limit our employees participation to the use of portable fire extinguishers. The site supervisor at safety orientation will cover this Plan. The following topics will include:

a) All areas controlled by the primary contractor are required to maintain fire protection during their occupancy. As a minimum smoke detectors and heat sensors shall be in place whenever the areas original fire protection has been compromised.

b) All fire extinguishers must be checked and tagged every thirty day

c) The general principles of fire extinguisher use and the hazards involved with incipient stage firefighting.

d) Actions to be taken by authorized person(s)

(1) Evacuate area.

(2) Notify site supervisor and/or project manager.

(3) Determine if fire is incipient

(4) Utilize fire extinguisher.

(5) If fire or smoke is too great, report to safe zone.

(6) Make call to Fire Department if instructed by supervisor and/or project manager.

e) Actions to be taken by unauthorized person(s)

(1) Evacuate area

(2) Notify supervisor and/or project manager.

(3) Report to safe zone.

(4) Make call to Fire Department if instructed by site supervisor and/or project manager.

f) Only approved fire extinguishers will be onsite and checked on a daily basis by the site supervisor. These will be located in the following areas, but not limited to:

(1) Portable Fire Extinguishers

(2) Individual Roles and Responsibilities

(3) Fire Watch

(4) Response Plans

(5) Safe Zone

(6) Notification

(7) Site Mapping

(8) Inside field office.

(9) In any area where cutting or welding is taking place

g) The following sections listed below are all part of this Accident Prevention Plan. The information below contains additional requirements that are part of this Fire Prevention Plan:

- Safety and Health Inspections
- Firefighting Plan
- Posting of Emergency Numbers
- Hazard Communication Program
- Site Sanitation Plan

(1) The risk of a job site fire can be avoided through; safety and health inspections, housekeeping, proper maintenance, proper storage and handling, ensuring all

employees and subcontractors are performing their designated work duties properly, the handling of supplies and equipment as directed, following all guidelines set forth through operating manuals, instructions, and training,

(2) All employees and subcontractors require the proper storage of combustibles. Combustible liquids must be stored and covered in approved containers.

(3) All chemical spills including, of course, combustible liquids, must be cleaned up immediately.

(4) All chemical and chemical products will be handled and stored in accordance with the procedures noted on their individual MSDS

Note: Care must be taken when cleaning up chemical spills. Information on appropriate personal protective equipment, proper disposal, proper cleanup procedures, required ventilation, etc is found on the products MSDS.

(5) Cleanup materials and damaged containers must be properly disposed.

(6) Combustible liquids and trash must be segregated and stored away from ignition sources.

(7) Approved portable fire extinguishers will be checked on daily basis, ensuring they are charged and ready for use.

(8) Smoking is not permitted inside the facility. Only designated areas by the VA will be permitted (outside), with smoking debris discarded in designated areas..

(9) Debris will not be allowed to accumulate on the job site and will be maintained daily.

h) Submission of a Burn Permit. **<Name>** Construction will submit a Burn Permit to the COR to perform acetylene oxygen welding, brazing and cutting, the following precautionary measures will be required as part of this permit along with any additional requirements by the VA Medical Center Policy 138-012 (Hot Work):

(1) Inspect all surroundings and equipment to insure that combustible substances are not present in any area where contact of metal at a temperature above the flashpoint of any compound is possible.

(2) Ensure that no open containers or spills of combustible substances are present.

(3) Ensure that ignition is not possible by conduction, convection, radiation, or dispersion of molten metal.

(4) Proper protection equipment and practices will be used, i.e., fireproof blankets, removal of combustible materials where practicable, and portable fire extinguishers of proper type on hand.

(5) When the above operations are in use a continuous Fire Watch will be performed while equipment is being used.

(6) Training in fire protection will occur at the site safety orientation. This training shall include the following topics, but not limited to:

a. **<List of Topics>**

9. SITE SAFETY RULES:

<Name> Construction Company has developed a comprehensive safety and health program that addresses our specific safety and health concerns and provides guidance for the

performance of our individual job tasks within the framework of appropriate Occupational Safety and Health Administration (OSHA) standards.

Safety requires not only that each person understand and perform individual tasks in a safe manner, but also that each individual is aware of his/her surroundings and is actively involved in the safety and health of others.

a) No Smoking: Smoking is not permitted inside the facility. Only designated areas by the VA will be permitted (outside), with smoking debris discarded in designated areas.

b) Accidents: In the event of an emergency, workers will notify the site supervisor or project manager of the situation, at that time, workers will report to the safe zone. The site supervisor and/or project manager will notify security and any other applicable authorities.

The goals for all projects are as follows:

(1) Zero accident rate

(2) Zero injury/illness rate

(3) Compliance with all applicable Local, State, OSHA standards and Veterans Affairs Safety Directives

c) Hard Hats: Head Protection will be as follows:

- All workers on this site will be required to wear approved hart hats when working in the close proximity of heavy equipment and where structural steel is being hoisted

- In the area where another workers activities may exposing them to injury.

d) Hazard Reporting: Each employee is encouraged to contact their Supervisor immediately should a safety or health risk exist so that corrective action may be taken immediately.

e) Controlled Substances: Therefore, the following actions are strictly prohibited and will prompt disciplinary action up to and including consideration for immediate discharge:

(1) The illegal use, sale, arranging for sale, possession or manufacturing of narcotics, drugs or controlled substances while on the job or on VA property.

(2) The use of alcohol or illegal drugs while on the job or VA property.

f) Safety Devices: **<Name>** Construction Company has fulfilled all required Safety and Health Plans and Programs according to regulation, and has installed all required safety device for the equipment being used for the tasks. Failure to use or to disable the mentioned safety device relating to CFR 1910 and 1926 standards to ensure 100% safety will be grounds for review .

The goal is to provide the company and its workers protection against those individuals who refuse to act in a consistently safe manner.

Without proper enforcement, the policy will not be able to deliver the intended results. Therefore, it is essential that all employees be held accountable to these guidelines for disciplinary actions up to and including discharge.

g) Personnel Protective Equipment: Procedures for implementing an effective PPE policy in accordance with 29 CFR 1910.132, will be as follows:

(1) During a pre-construction walk through, **<Contact Name>**, the Project Manager, will perform a job site hazard assessment.

(b) HAZARD ASSESSMENT: The purpose of the survey is to identify sources of hazards to workers and co-workers. The documentation of this hazard assessment is located in PCRA (Pre-Construction Risk Assessment)

(c) POTENTIAL HAZARD SOURCES **<Adjust based on scope of work>**

- **<Surfaces that could become slick, uneven walking and working surfaces>**
- **<Welding / Brazing Hazards>**
- **<Quality Air Control>**
- **<Electrical Hazards>**
- **<Potential Overhead Obstructions (above ceiling)>**
- **<Fall Protection>**
- **<Rolling or pinching objects>**
- **<Sharp objects that might pierce feet or cut hands>**
- **<Motion that includes tool movement, moving machinery, or machine parts, or movement of personnel that could result in collision with stationary objects.>**

(d) EMPLOYEE TRAINING: **<Name>** Construction Company employees will be trained, at the site safety orientation on the following topics:

- When PPE is necessary.
- What PPE is necessary and which PPE has been selected for each process the employee operates.
- How to properly put on, take off, adjust and wear PPE.

(2) Each of the basic hazards has been reviewed and a determination made as to the type, level of risk, and seriousness of potential injury.

- When exposure to hazards cannot be engineered completely out of normal operations or maintenance work.
- When safe work practices cannot provide sufficient additional protection.
- A Final method of control is through the use of protective clothing or equipment. These include eye protection, steel-toed shoes, hard hats, hearing protection, gloves, and fall protection

(3) Consideration has been given to the possibility of exposure to several hazards at once. The general procedure for determining appropriate protective equipment is to:

- Identify the potential hazards and the type of protective equipment that is available, and what protection it provides.
- Compare the capabilities of various types of PPE with the hazards associated with the environment.
- Select the PPE, which provides a level of protection greater than the minimum required to protect employees from the hazards.
- Select PPE that will fit each employee properly and provides protection from the hazard.
- The Hazard Assessment Worksheet is located in Appendix D.

h) Horseplay: Safety training needs will be identified by continual reassessment of our work methods, equipment and job sites as well as employee and management input. Observation of unsafe acts will be addressed immediately.

i) Reporting Under the Influence:

(1) Arriving at work or working under the influence of alcohol or illegal drugs, narcotics or controlled substances.

(2) Any illegal substance confiscated pursuant to this policy will be turned over to the proper authorities.

j) Flammable Liquid Storage: It is mandatory that all subcontractors submit, before a

new chemical is introduced to the worksite, that the proper MSDS is submitted to the site supervisor/project manager. It will be the responsibility of the site supervisor to inform all employees and subcontractors of the new chemical(s), introduce the MSDS, and the potential hazards of that chemical. The site supervisor and/or project manager will have the responsibility to notify the Contracting Officer / COR of any and all new chemicals brought onto the facility.

k) Heavy Equipment Operation

10. WEEKLY CONTRACTOR REVIEWS:

a) The primary site supervisor, who is the competent person (certifications in Appendix will conduct the initial employee site safety orientation.

b) Mandatory safety meetings will be held on a weekly basis. Safety and health topics will vary from week to week on subject matter, utilizing the 29 CFR 1910 and 29 CFR 1926 standards, along with the Veterans Affairs Safety and Health Program and issues raised during construction.(Place documentation of training sign-in sheets and agenda in Appendix B)

c) Safety takes a commitment from all personnel within our organization. Weekly Training will be interactive with an opportunity for all to actively participate, ask questions, make suggestions, and refer to our written policies and procedures.

11. COMPETENT PERSON:

a) A Site Safety and Health Officer (SSHO) will be provided at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor and subcontractors.

b) The SSHO will be employed by the prime. SSHO qualifications with education certificates will be listed in Appendix B.

d) There will be a competent person for maintaining a Health Hazard Control and Respiratory Protection Program. They will conduct and document a hazard assessment in accordance with Section 06 to identify and evaluate the need and level of protection required for the activities being scheduled. (What form of documentation).

d) Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Safety inspection logs shall be attached to the Contractors daily quality control report. Current "Safety Logs" shall be readily available upon request.

12. WRITTEN PROTOCOLS FOR OUTSIDE INSPECTIONS:

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a) Presentation of Credentials - Upon arrival at the work site or facility, the OSHA compliance officer must display his or her credentials and will ask to meet with the appropriate employer representative.

b) The contractor must notify the COR immediately upon the initial OSHA Contact.

(1) Opening Conference – During an opening conference, the compliance officer will explain the purpose of the inspection. Contractor Management representatives must be prepared to discuss actions that have been taken to demonstrate their company's commitment to the health and safety of employees (e.g. work practices, safety and industrial hygiene standards, safety manuals, training conducted, internal inspections, etc).

(2) An authorized employee representative will be given the opportunity to attend the opening conference and to accompany the compliance officer during the inspection. Employees may also be consulted during the conduct of the inspection. Employees who participate in the inspection, or

are consulted by the compliance officer, are protected under the OSHA act from discrimination for exercising their safety and health rights.

(3) A contractor management representative and a VAMC Cleveland Safety representative must accompany the compliance officer during the inspection and keep accurate notes of any actual or possible violations found by the compliance officer. Obvious violations detected by the compliance officer should be corrected on the spot where possible.

(4) It is imperative that existing operations, reports, logs, etc. not be misrepresented to the compliance officer. The penalty for making false statements or representation to OSHA or its compliance officers is a maximum of $10,000 and 6 months imprisonment. In addition, the offending party can be subject to discipline by the company up to and including discharge

(5) Closing Conference - After the inspection has been conducted, a closing conference will be held between the compliance officer, the employer and employee representatives and VAMC Cleveland. This is the best time, before possible issuance of a citation, to explain the company's position. It is imperative that we question any proposed findings or abatement periods that are unreasonable. Request that any citations be sent to the company with a copy to the VAMC Cleveland safety office.

13. SUBCONTRACTOR SITE SPECIFIC SAFETY PLAN:

As part of employment with **<Name>** Construction Company, **employees** are required to comply with all aspects **of their** corporate level "Safety and Health Plan".

- Supervisors are expected and required to comply with all aspects of the corporate level "Safety and Health Plan" as well as to enforce all applicable requirements at the jobsite.

- Supervisors are expected and required to complete all necessary site safety documentation in a complete and timely manner.

- Supervisors are required to report all safety incidents to the main office as soon as possible. The projects COR is to be notified ASAP. The above items represent the method used to ensure our goals are met.

14. REQUIRED POSTERS:

This Policy Statement will be conspicuously posted in the job site office along with all other required postings including the OSHA Form 300, Log and Summary of Occupational Injuries and Illnesses.

15. SUBCONTRACTOR/SUPPLIERS ORIENTATION PROGRAM:

a) Identification of subcontractors:

<Name of Subcontractor> (List all subcontractors expected to be on site)

b) Controlling and coordination of subcontractors and suppliers:

Suppliers will be under close supervision during material delivery and pick-up. Communication with suppliers will be important to ensure loads are put in designated areas, and supplier is made aware of any immediate hazards in the area he/she will be in. A project schedule has been coordinated and submitted for approval for the coordination of the scope of work being performed.

c) SAFETY RESPONSIBILITIES OF SUBCONTRACTORS AND SUPPLIERS:

All subcontractors will be responsible to Submit and implement their corporate level Safety and Health Plan as appropriate for the project. Subcontractor shall submit these documents to **<Name>** Construction Company for approval prior to the start of their activities on the work site. In addition, they will be responsible for adhering to all applicable OSHA and the Veterans Affairs Safety and Health Program requirements. These documents will be verified through our own site safety inspections and meetings.

In the event that a subcontractor does not have the required safety and health programs, their employees will receive training utilizing **<Name>** Construction Company's safety and health programs prior to accessing the work site. This training will be documented and compliance with the provisions of **<Name>** Construction Company's Safety and Health programs will be mandatory as well as being readily accessible.

16. REPORTING OF CATASTROPHIC EVENTS:

It is the policy of **<Name>** Construction Company to provide a work environment that is inherently safe. The safety and health of our employees is of primary importance as they are our most important resource

- Pre-emergency planning and coordination with outside parties:

  VAMC (COR) will receive notification of date to start work, along with MSDS's of all substances brought onto the facility.

- Personal roles, lines of authority, training, and communication:

  The personnel utilizing chemicals will contain the substances brought onto the facility. Plumbers will contain and handle all compressed gas cylinders, providing they have been trained and documented.

  In the case where a situation occurs that they cannot handle, all employees will be trained on evacuating the area, notifying the on-site supervisor, and workers in the immediate worksite.

- Emergency recognition and prevention:

  All workers will, at the safety orientation, be informed of this site-specific emergency response plan and procedures.

  All workers will be responsible to recognize hazards and their prevention, practice this at all times on the worksite.

All workers will be responsible to answer question from surveyors about general safety, health, and emergency procedures wherever they are on site.

- Safe distances and places of refuge:

All workers at this site will be informed of the designated location of the safe zone. This will also be posted in the field office for all to be reminded of. In the event of an emergency occurrence, and the Local Fire Department, or any other entity is summoned, all workers will report to this zone to be accounted for.

- Site security and control:

In the event of an emergency, workers will notify the site supervisor or project manager of the situation, at that time, workers will report to the safe zone. The site supervisor and/or project manager will notify security and any other applicable authorities. Staying away from the immediate situation and not allowing any unauthorized personnel to enter until proper authorities arrive.

- Evacuation routes and procedures:

Any work will be performed on the interior of the building. Evacuation plans are posted in various locations throughout work area by the VA.

- Decontamination:

This would be required if there is a possibility of a large spill of hazardous material with the potential of contaminating contractor employees. Small spills and personnel contaminations are expected to be cleaned up using the contractors Hazard Communication program and associated MSDS requirements.

- Emergency medical treatment and first aid:

- Emergency alerting and response procedures:

  It will be the duty of all workers onsite, including subcontractors, to immediately report to the site supervisor and/or project manager, COR's any and all emergencies

17. Site specific plans to address PCRA:

a. Only those hazards identified as "yes" on the PCRA need to be addressed.

b. Modify the description of the safety precautions as needed to address the specific concern. You may refer to a company policy or company rule book to describe the safety precautions or safety plan; however, we will need to have a copy of your plan or policy on file.

c. To place a check in the box

- right click on the box
- Click "Properties"
- Click "Checked"
- Click "OK"

Pre Construction Risk Assessment (PCRA)

	Description of safety precautions or reference to contractor Safety Procedures
☐	(1) Respiratory Protection Plan ○ **Describe of ACTIVITY requiring respiratory protection if applicable** ○ **NEED documentation of training.** ○ **Need documentation of fit test.**
☐	(2) Hearing: Protection Plan Any area with noise levels at or above 85dba will be required to wear hearing protection. When workers are utilizing loud equipment, or being exposed to such levels, hearing protection shall be provided.
☐	(3) PPE other: Personal protective equipment (PPE) includes hard hats, gloves, safety glasses, steel-toed shoes/boots, hearing protection, and personal fall protection. Eye protection will be as follows: ○ Safety glasses used for any worker performing, observing tasks that may result in flying objects, dust, or in the area where another workers activities may exposing them to eye injury. ○ During welding/cutting operations, the required filter lenses will be utilized according to the operation, electrode size and arc current. Foot Protection: ○ All workers will be required to wear the appropriate foot protection. ○ Steel-toed shoes/boots are mandatory. Hand Protection: ○ Workers may be exposed to hand injuries from;

	▪ sharp objects, ▪ abrasive materials ▪ and weather. ○ Gloves designed to protect against the specific hazard encountered are an effective means of reducing such risks and will be used on this project.
☐	(4) Overhead hazards: **<(Example)There will be X critical lifts required on this project. A crane will be utilized to load new materials onto Xth floor roof and remove demolished material from the roof. A plan will be submitted** and approved **prior to this work being performed.>**
☐	(5) Confined space: Procedures for entering a confined space depend on the type of confined space and the scope of work associated with the entry. a) The VAMC Cleveland Confined Space Entry Program provides the detailed information necessary for regulatory compliance. The contractor may use the VAMC Program or their own providing that it meets regulatory compliance and is reviewed and approved before entry is made. b) Under no circumstances should a person enter into a posted confined space without notifying the COR. A “Shutdown Request” reviewed by Occupational Health and Safety and approved by the COR will be used for this notification. c) Sub-basements are considered non-permit required confined spaces unless welding is performed or other hazards introduced that may create a hazardous atmosphere. When atmospheric hazards are identified then the sub-basements will be worked under the alternate procedure provisions provided that continuous ventilation is used to control the atmospheric hazard. d) Areas posted as “Permit Required” confined spaces will not be entered unless the hazards are eliminated and the space is reclassified. All tanks, voids, ventilation ducts and sewers are considered “Permit Required” confined spaces unless a hazard assessment is conducted and the space is reclassified. e) Employees entering confined spaces will be trained. Training will be based on the Confined Space Entry Program, ANSI National Standard “Safety Requirements for working in Tanks and other Confined Spaces” (ANSI Z117.1), or equivalent training

☐	(6) Ladders: Workers that may be performing work on ladders are instructed to adhere to the following: ▪ Inspect before using ▪ Place ladder using 4 to 1 rule ▪ Never place base of ladder on objects ▪ Never place ladder in front of door unless ▪ Door is blocked in open position ▪ Door is demarcated off ▪ Door is locked
☐	(7) Scaffolding: For work that requires scaffolding use for employees and subcontractors, personal fall protection shall be mandatory, unless working less than 6 ft. The following topics listed will be conveyed to workers prior to scaffolding use ▪ Review scaffolding supplier pamphlet for proper construction ▪ Inspect scaffolding structure before initial use/and daily ▪ Report any defects immediately / do not use / tag out of service ▪ Placement of structure ▪ When fall protection is required ▪ What you can tie off to
☐	(8) Work platforms: Describe type of platform required and specific requirements for its use.
☐	(9) Fall protection**:** Personal Fall Protection **<Name>** Construction Company requires all employees working at or above 6' to wear personal fall protection, unless the personal fall protection creates a safety hazard by utilizing it. In that case, other means of fall protection shall be provided.
☐	(10) Asbestos: As part of the Asbestos program, **<Name>** Construction Company will inform subcontractors, or their representatives of the site emergency response

		procedures and any potential fire, explosion, health, safety, or other hazards. The substances listed in Section 13, paragraph c, under MSDS, have the potential to be released or spilled. Section 13.c, Hazard Communication, lists some potential hazards that contractors and/or subcontractors my encounter. Also listed are the response actions to be taken and the proper notification.
☐	(11)	Hazardous materials: The substances listed in Section 13 paragraph c, under MSDS, have the potential to be released or spilled. Section 13 c, Hazard Communication, lists some potential hazards that contractors and/or subcontractors my encounter. Also listed are the response actions to be taken and the proper notification. MSDS sheets must be made available for review by the VAMC and contracted employees.
☐	(12)	Hot work: The **<Name>** Construction Company will follow VAMC Cleveland's Hot work Policy (MCP 138-012), **<Name>** Construction will submit a Hot Work Permit to the COR to perform acetylene oxygen welding, brazing and cutting, the following precautionary measures will be required. ▪ Inspect all surroundings and equipment to insure that combustible substances are not present in any area where contact of metal at a temperature above the flashpoint of any compound is possible. ▪ Ensure that no open containers or spills of combustible substances are present. ▪ Ensure that ignition is not possible by conduction, convection, radiation, or dispersion of molten metal. ▪ Proper protection equipment and practices will be used, i.e., fireproof blankets, removal of combustible materials where practicable, and portable fire extinguishers of proper type on hand. ▪ When the above operations are in use a continuous Fire Watch will be performed while equipment is being used. ▪ Training in fire protection will occur at the site safety orientation.
☐	(13)	Ventilation: **<Describe the type of forced ventilation that will be used and the reason it is required. Example: A 500 CFM Red Devil blower will be set up for welding operations in the sub-basement. The exhaust of this blower will be directed to the outside.>**

☐	(14)	Power distribution: Describe the circumstances that would make it necessary for disruption of power from the main power lines or associated transformers entering the facility.
☐	(15)	Work being done on energized equipment: Any work to be done on Energized Equipment must be done in accordance with Medical Center Policy (MCP) 138 – 03 (Working on Energized Equipment). The Medical Centers Directors permission is required to work any circuit energized. A Energized Circuit Work permit must be approved before starting work.
☐	(16)	Other electric: List Specifics
☐	(17)	Loto: ▪ Only VA Employees will manipulate breakers or valves to perform a Lock Out Tag unless specific permission (in writing) is obtained by the Assistant Chief Engineering, M&O. ▪ The VA will hang Locks or tags on valves or breakers as requested by the project manager. ▪ After the VA places their lock on the device, then **<Name>** Construction Company will be allowed to place their lock on the device. ▪ When clearing the Lock Out Tag Out, **<Name>** Construction. ▪ Company will remove **<Name>** Construction's locks and notify the COR. ▪ The VA will then remove the VA locks and reposition the valve or breaker at the request of **<Name>** Construction Company.
☐	(18)	Crane operation: **<(Example) There will be X critical lifts required on this project. A crane will be utilized to load new materials onto Xth floor roof and remove demolished material from the roof. A plan will be submitted and approved prior to this work being performed.>**
☐	(19)	Excavating; Trenches, ditches – Describe the type, name of competent person, trench boxes required and if necessary air sampling requirements.

☐	(20)	Earthmoving: **(Example)** The use of this equipment will be required on this project for moving of earth. Safety will be the responsibility of the company performing the work.
☐	(21)	Industrial trucks: **(Example)** The use of this equipment will be required on this project for loading materials onto the Xth floor roof. Industrial truck safety will be the responsibility of the company performing the work.
☐	(22)	Other motorized equipment: List type and specific use. Only qualified operators will be allowed to operate motorized equipment. Diesel powered equipment will not be used near medical Center Ventilation Intakes.
☐	(23)	Concrete, Masonry operations: Describe the work to be performed and what fall protection will be provided for workers on forms that are higher than six feet.
☐	(24)	Steel Erection: Describe the type of steel erection, fire protection coatings used and fall protection requirements if not already addressed in (10) Fall Protection.
☐	(25)	Alteration or Improvement of existing Electrical transmission and distribution lines and equipment. – Describe the scope of work and provisions made to ensure that the facility does not lose power during the work.
☐	(26)	Hand & portable tools a) Hand Tools .1 For your own protection, do not misuse your tools. Use tools only for the purpose for which they were designed. .2 Your job will be easier and much safer if tools are in good condition. Take care in handling and storing tools. .3 You and the person in charge must be satisfied that all the tools you use on the job, whether they are Company- or personally-owned, are in safe

condition.

.4 Tools with mushroomed heads, loose, split or broken handles, broken screw drivers, defective pliers, wrenches with spread jaws, defective cords, ground wires and plugs, etc., must not be used.

.5 Never use a defective tool. Defective tools are to be removed from service and marked defective.

.6 For your own protection, do not misuse your tools.

.7 Cover sharp-edged and pointed tools with scabbards and guards. Always use the guards when the tools are not in use.

.8 Never strike the hardened part of one tool against the hardened part of another tool or against any hardened surface.

.9 Never use a file with a tang unless it is equipped with a handle.

.10 Never throw tools from one person to another or from one level to another.

.11 Hot tools, equipment or materials on tables or benches, even if they are metal covered, shall be properly identified.

.12 Never use improper handles when you work with jacks. Always remove handles when they are not being used.

.13 Never use metal-shielded spotlights or flashlights around exposed electrical equipment.

b) Extension Cords

.1 Use only approved extension cords and lamp guards. Extension cord lamps used in explosion-hazard atmospheres, such as oil vapor or flammable gases, must be equipped with guards and vapor-proof globes. Do not use a lamp with a switch.

.2 When you use an extension cord around switchboards, switch structures or electrical equipment, it must have a non-metallic socket and guard.

.3 Use only specially approved low voltage (6 or 12 Volt) extension cords or ground fault circuit interrupter (GFCI) when you need portable lighting in wet locations. This type of cord should be used when you work outdoors, in tanks or in other areas where moisture or condensation may be a hazard.

.4 Use GFCI protected circuits where required by the electric code. If there is a question about the requirements, contact Engineering Service for resolution.

c) Tool Containers

.1 Cover any grating to prevent your tools or material from falling. When you are working on scaffolds or platforms, use a suitable container for any of your tools that are not actually being used.

d) Power Tools

.1 Always wear the proper personal protective equipment including but not limited to eye protection.

.2 Before you use any power tool, check to make sure:

- .it is properly tested;
- all guards are in place;
- all material is properly secured;
- you disconnect the tool electrically before inserting or removing any attachments; and
- you use GFCI protected circuits when required.

.3 While a machine is in operation:

- never remove chips with your hand; always use a suitable brush, hook or stick;
- do not let the machine run unattended;
- do not place tools or materials on machines where they can be jarred or pushed off;
- never try to stop a machine using your hands or any other part of your body as a brake; and
- both hands shall be used when working with portable tools.

.4 You must unplug power tools when they are left unattended. You must

		shut off and de-pressurize (bleed down) pneumatic- or hydraulic-operated tools when they are left unattended. .5 Keep the floor around machines clean and free from oil. If you spill any oil, wipe it up immediately or use an oil absorbent. Slipping is one of the most common causes of accidents. .6 Carefully inspect grinding machines before you use them. Be sure that: • you perform a ring test prior to installing a new wheel; • the wheel is secure on the driving shaft; • the wheel is in good condition; dress or replace the wheel as necessary; • the work rest is adjusted properly; and • the safety guard is in place and allows proper visibility to do the work. • Do not use the side of the wheel for grinding, unless it is specifically designed for side grinding. • Many wheels cannot stand up under side grinding. • Never drive a grinding wheel at speeds above that specified by the manufacturer. • When you grind small objects, hold them firmly in place with a suitable tool, not with your fingers. • Do not grind soft metals such as aluminum
☐	(27)	Compressed Gasses: Compressed gas cylinders may be used at this worksite. These cylinders and gases present an injury hazard in the event that a regulator or cylinder is damaged and/or broken. The particular gases used will be **<Name Gas>.** These hazards will be reduced by routine inspections and maintenance of compressed gas cylinders and by assuring all the units are secured from tipping. Safety caps will be installed on all cylinders that are not in use. Compressed gas cylinder will be kept away from excessive heat, will not be stored where they might be damaged or knocked over by passing or falling objects. The storage of oxygen and fuel gas compressed cylinders will be separated by at least 20 ft.
☐	(28)	Other hazardous activities **<(Name and describe safety precautions)>**

☐	(29)	Infection Control : Infection Control (216-791-3800 Ext 4791) has been contacted for work in patient care or high risk areas to conduct an Infection Control Risk Assessment (ICRA). Provisions of the ICRA will be followed unless changed by Infection Control.
☐	(30)	Life Safety: Occupational Health and Safety 216-791-3800 Ext 4172 has been contacted to conduct a Life Safety Risk Assessment. Interim Life Safety measures have been determined and will be posted outside of the construction area. Fire extinguishers will be provided inside the construction area and they will be inspected at a minimum of 30 day intervals. Provisions of the Interim Life Safety measures will be followed unless modified by Occupational Health and Safety. If penetrations are made in smoke/fire barriers the COR will verify that they have been appropriately sealed before project completion.
☐	(31)	Emergency Procedures: Standard Emergency Response Plan is described in section 7. Additional provisions required for rescuing employees working at heights or working in Permit Required Confined Spaces will be as follows: **<Describe Specifics>**
☐	(32)	Demolition: Demolition is described in the Scope of Work Summary. Collection of demolition debris for recycling will minimize dust generation. All containers will be covered and employees will use appropriate methods for controlling the spread of dust outside the construction zone.
☐	(33)	New Construction Recycling: A minimum of <X%> of total project waste will be diverted to a landfill. a) Concrete b) Steel
☐	(34)	Interior Remodeling Recycling: A minimum of <X%> of total project waste will be diverted to a landfill. a) Ceiling Tile b) Steel c) Carpet
☐	(35)	General Recycling: The following categories of waste shall be diverted from a

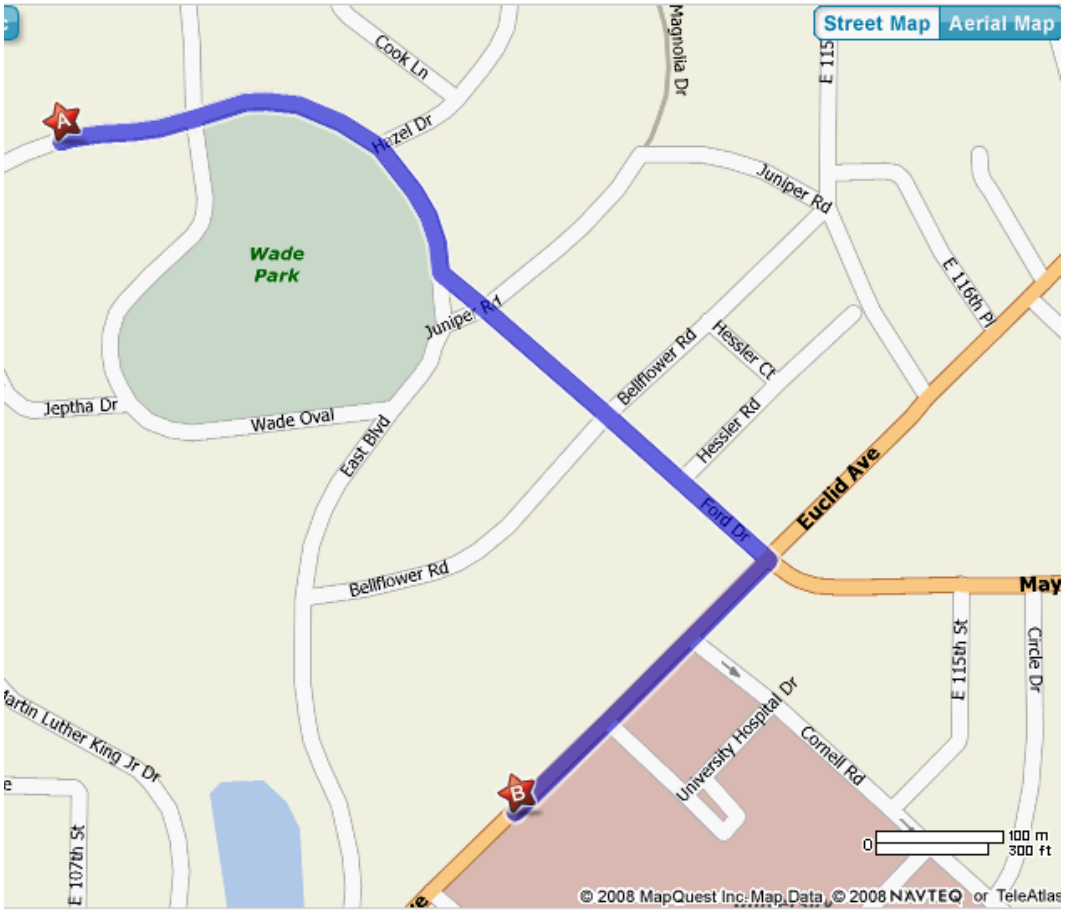
	landfill (Check all that apply):	
	☐	Green Waste (Biodegradable landscaping material)
	☐	Soil
	☐	Inserts (concrete, asphalt, masonry)
	☐	Clean dimensional wood, palette wood
	☐	Engineered wood products, plywood, particle board, I joints, etc.
	☐	Cardboard Paper packaging
	☐	Asphalt Roofing materials
	☐	Insulation
	☐	Gypsum board
	☐	Carpet and pad
	☐	Paint
	☐	Plastics: ABX, PVC
	☐	Beverage containers

APPENDIX A

Evacuation Routes Work Zone Layouts and Maps to Emergency Services

Contractor and subcontractors working in the Medical Center will follow the posted exit signs and maps to evacuate the medical Center. To ensure all employees have been evacuated, they will meet at **<Location>.**

Map from VAMC Cleveland (Wade Park Division) to University Hospital


Street Map
Aerial Map
Cook Ln
Hazel Dr
Magnolia Dr
E 115
Juniper Rd
Wade Park
Juniper Rd
E 116th Pl
Bellflower Rd
Hessler Ct
Hessler Rd
Jeptha Dr
Wade Oval
East Blvd
Euclid Ave
Ford Dr
Bellflower Rd
E 115th St
Circle Dr
University Hospital Dr
Cornell Rd
Martin Luther King Jr Dr
E 107th St
0
100 m
300 ft
© 2008 MapQuest Inc. Map Data © 2008 NAVTEQ or TeleAtlas

APPENDIX B

CERTIFICATIONS

&

JOBSITE DOCUMENTATION PROGRAM

<List all individuals including their titles, who have completed

1. **OSHA 30 Hour Construction Safety Course**
2. **OSHA 10 Hour construction Safety Course**
3. **Competent Person Certifications for Respiratory Protection, Fall Protection, Trenching and Shoring, etc. as required by the Scope of Work and applicable regulations.>**

APPENDIX C

CONTRACTOR ACCIDENT RECORD

OSHA 300 FORM

<To be updated and maintained in the on site construction office or the service company if an office is not located on station.>

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to – GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.

B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

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

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

DEPARMENT 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.acgih.org

ACI American Concrete Institute
http://www.aci-int.net

ACPA American Concrete Pipe Association
http://www.concrete-pipe.org

ACPPA American Concrete Pressure Pipe Association
http://www.acppa.org

ADC Air Diffusion Council
http://flexibleduct.org

AGA American Gas Association
http://www.aga.org

AGC Associated General Contractors of America
http://www.agc.org

AGMA American Gear Manufacturers Association, Inc.
http://www.agma.org

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.cpmb.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.et1.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

- - - E N D - - -

SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies materials testing activities and inspection services required during project construction to be provided the Contractor.

1.2 APPLICABLE PUBLICATIONS:

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

B. American Association of State Highway and Transportation Officials (AASHTO):

T27-11.....Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates

T96-02 (R2006).....Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

T99-10.....Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop

T104-99 (R2007).....Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

T180-10.....Standard Method of Test for Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop

T191-02(R2006).....Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method

C. American Concrete Institute (ACI):

506.4R-94 (R2004).....Guide for the Evaluation of Shotcrete

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

A325-10.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

A370-12.....Standard Test Methods and Definitions for Mechanical Testing of Steel Products

A490-12.....Standard Specification for Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

C31/C31M-10.....Standard Practice for Making and Curing Concrete Test Specimens in the Field

C33/C33M-11a.....Standard Specification for Concrete Aggregates

C39/C39M-12.....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

C109/C109M-11b.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars

C136-06.....Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

C138/C138M-10b.....Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

C140-12.....Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

C143/C143M-10a.....Standard Test Method for Slump of Hydraulic Cement Concrete

C172/C172M-10.....Standard Practice for Sampling Freshly Mixed Concrete

C173/C173M-10b.....Standard Test Method for Air Content of freshly Mixed Concrete by the Volumetric Method

C330/C330M-09.....Standard Specification for Lightweight Aggregates for Structural Concrete

C567/C567M-11.....Standard Test Method for Density Structural Lightweight Concrete

C780-11.....Standard Test Method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

C1019-11.....Standard Test Method for Sampling and Testing Grout

C1064/C1064M-11.....Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

C1077-11c.....Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

C1314-11a.....Standard Test Method for Compressive Strength of Masonry Prisms

D1188-07e1.....Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples

E164-08.....Standard Practice for Contact Ultrasonic Testing of Weldments

E329-11c.....Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

E543-09.....Standard Specification for Agencies Performing Non-Destructive Testing

E605-93(R2011).....Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members

E1155-96(R2008).....Determining FF Floor Flatness and FL Floor Levelness Numbers

E. American Welding Society (AWS):

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

1.3 REQUIREMENTS:

A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by COR. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of COR to such failure.

C. Written Reports: Testing laboratory shall submit test reports to COR, Contractor, unless other arrangements are agreed to in writing by the COR. Submit reports of tests that fail to meet construction contract requirements on colored paper.

D. Verbal Reports: Give verbal notification to COR immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONCRETE:

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of COR with concurrence of Contracting

Officer and perform periodic inspections thereafter as determined by COR.

2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to COR.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

B. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads are to be removed from the site at the Contractor’s expense. Any rejected concrete that is placed will be subject to removal.
3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 m^3 (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. After good concrete quality control has been established and maintained as determined by COR make three cylinders for each 80 m^3 (100 cubic yards) or less of each concrete type, and at least three cylinders from any one day's pour for each concrete type. Label each cylinder with an identification number. COR may require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped

concrete at the hopper and at the discharge end of the hose at the beginning of each day's pumping operations to determine change in slump.

5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 m^3 (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m^3 (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. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
12. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
13. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
14. 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.

15. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
16. Observe concrete mixing:
    a. Monitor and record amount of water added at project site.
    b. Observe minimum and maximum mixing times.
17. 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 COR 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.
18. Other inspections:
    a. Grouting under base plates.
    b. Grouting anchor bolts and reinforcing steel in hardened concrete.

C. Laboratory Tests of Field Samples:

1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by COR. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
3. Furnish certified compression test reports (duplicate) to COR. In test report, indicate the following information:
    a. Cylinder identification number and date cast.
    b. Specific location at which test samples were taken.
    c. Type of concrete, slump, and percent air.
    d. Compressive strength of concrete in MPa (psi).
    e. Weight of lightweight structural concrete in kg/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 MASONRY:

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

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

C. Masonry Unit Tests:
1. Laboratory Compressive Strength Test:
a. Comply with ASTM C140.
b. Test 3 samples for each 460 m^2 (5000 square feet) of wall area.

D. Prism Tests: For each type of wall construction indicated, test masonry prisms per ASTM C1314 for each 460 m^2 (5000 square feet) of wall area. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

3.3 STRUCTURAL STEEL:

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

B. Prefabrication Inspection:
1. Review design and shop detail drawings for size, length, type and location of all welds to be made.
2. Approve welding procedure qualifications either by pre-qualification or by witnessing qualifications tests.
3. Approve welder qualifications by certification or retesting.
4. Approve procedure for control of distortion and shrinkage stresses.

5. Approve procedures for welding in accordance with applicable sections of AWS D1.1.

C. Fabrication and Erection:

1. Weld Inspection:
   a. Inspect welding equipment for capacity, maintenance and working condition.
   b. Verify specified electrodes and handling and storage of electrodes in accordance with AWS D1.1.
   c. Inspect preparation and assembly of materials to be welded for conformance with AWS D1.1.
   d. Inspect preheating and interpass temperatures for conformance with AWS D1.1.
   e. Measure 25 percent of fillet welds.
   f. Welding Magnetic Particle Testing: Test in accordance with ASTM E709 for a minimum of:
      1) 20 percent of all shear plate fillet welds at random, final pass only.
      2) 20 percent of all continuity plate and bracing gusset plate fillet welds, at random, final pass only.
      3) 100 percent of tension member fillet welds (i.e., hanger connection plates and other similar connections) for root and final passes.
      4) 20 percent of length of built-up column member partial penetration and fillet welds at random for root and final passes.
      5) 100 percent of length of built-up girder member partial penetration and fillet welds for root and final passes.
   g. Welding Ultrasonic Testing: Test in accordance with ASTM E164 and AWS D1.1 for 100 percent of all full penetration welds, braced and moment frame column splices, and a minimum of 20 percent of all other partial penetration column splices, at random.
   h. Verify that correction of rejected welds are made in accordance with AWS D1.1.
   i. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.
2. Bolt Inspection:
   a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.

b. Slip-Critical Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in each connection in accordance with AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
c. Fully Pre-tensioned Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in 25 percent of connections in accordance with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
d. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.
e. Snug Tight Connections: Inspect 10 percent of connections verifying that plies of connected elements have been brought into snug contact.
f. Inspect field erected assemblies; verify locations of structural steel for plumbness, level, and alignment.

D. Submit inspection reports, record of welders and their certification, and identification, and instances of noncompliance to COR.

3.4 STEEL DECKING:

A. Provide field inspection of welds of metal deck to the supporting steel, and testing services to insure steel decking has been installed in accordance with contract documents and manufacturer’s requirements.
B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with “Welder Qualification” procedures of AWS D1.1. Refer to the “Plug Weld Qualification Procedure” in Part 3 “Field Quality Control.”
C. Submit inspection reports, certification, and instances of noncompliance to COR.

3.5 SHEAR CONNECTOR STUDS:

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

3.6 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 COR.

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 m^2 (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 m^2 (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 COR.

3.7 TYPE OF TEST:

Approximate Number of Tests Required

_____

A. 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) _____

B. Reinforcing Steel:

Tensile Test (ASTM A370) _____

Bend Test (ASTM A370) _____

Mechanical Splice (ASTM A370) _____

Welded Splice Test (ASTM A370) _____

C. Masonry:

Making and Curing Test Cubes (ASTM C109) _____

Compressive Strength, Test Cubes (ASTM C109) _____

Sampling and Testing Mortar, Comp. Strength (ASTM C780) _____

Sampling and Testing Grout, Comp. Strength (ASTM C1019) _____

Masonry Unit, Compressive Strength (ASTM C140) _____

Prism Tests (ASTM C1314) _____

D. Structural Steel:

Ultrasonic Testing of Welds (ASTM E164) _____

Magnetic Particle Testing of Welds (ASTM E709) _____

Radiographic Testing of Welds (ASTM E94) _____

E. Sprayed-On Fireproofing:

Thickness and Density Tests (ASTM E605) _____

L. Inspection:

Technical Personnel (Man-days) _____

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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.
   3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
   4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
   5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.

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

1.2 QUALITY CONTROL

A. Establish and maintain quality control for the environmental protection of all items set forth herein.

B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.3 REFERENCES

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

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

1.4 SUBMITTALS

A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
   1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the COR to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the COR and the Contracting Officer for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
      a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
      b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
      c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.

d. Description of the Contractor's environmental protection personnel training program.

e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.

f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.

g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.

h. Permits, licenses, and the location of the solid waste disposal area.

i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the District Office of the U.S. Soil Conservation Service and the Department of Veterans Affairs.

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. This plan may be incorporated within the Erosion Control Plan.

B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period

of this contract. Confine activities to areas defined by the specifications and drawings.

B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the COR. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.

C. 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 Ohio and title of State Air Pollution Statue, Rule, or Regulation 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. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard

or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.

3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.

D. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.

1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00p.m unless otherwise permitted by local ordinance or the COR. 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,	80	PNEUMATIC TOOLS	80

STATIONARY			
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 representative noting any problems and the alternatives for mitigating actions.

G. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.

H. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the Contracting officer 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

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 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. 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.

1.3 QUALITY ASSURANCE

A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:

1. Excess or unusable construction materials.
2. Packaging used for construction products.
3. Poor planning and/or layout.
4. Construction error.
5. Over ordering.
6. Weather damage.
7. Contamination.
8. Mishandling.
9. Breakage.

B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.

C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.

D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.

E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website http://www.wbdg.org/tools/cwm.php provides a Construction Waste Management Database that contains

information on companies that haul, collect, and process recyclable debris from construction projects.

F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.

H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 TERMINOLOGY

A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.

B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.

C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.

D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.

E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).

F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.

G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.

H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.

I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.

J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.

K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.

L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.

   1. On-site Recycling – Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
   2. Off-site Recycling – Materials hauled to a location and used in an altered form in the manufacture of new products.

M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.

N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.

O. Return: To give back reusable items or unused products to vendors for credit.

P. Salvage: To remove waste materials from the site for resale or re-use by a third party.

Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.

R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.

S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

1.5 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:

B. Prepare and submit to the COR a written demolition debris management plan. The plan shall include, but not be limited to, the following information:

1. Procedures to be used for debris management.
2. Techniques to be used to minimize waste generation.
3. Analysis of the estimated job site waste to be generated:
   a. List of each material and quantity to be salvaged, reused, recycled.
   b. List of each material and quantity proposed to be taken to a landfill.
4. Detailed description of the Means/Methods to be used for material handling.
   a. On site: Material separation, storage, protection where applicable.
   b. Off site: Transportation means and destination. Include list of materials.
      1) Description of materials to be site-separated and self-hauled to designated facilities.
      2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
   c. The names and locations of mixed debris reuse and recycling facilities or sites.
   d. The names and locations of trash disposal landfill facilities or sites.
   e. Documentation that the facilities or sites are approved to receive the materials.

C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.

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

1.6 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

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

B. List of each material and quantity proposed to be taken to a landfill.

C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART 3 - EXECUTION

3.1 COLLECTION

A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.

B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.

C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

3.2 DISPOSAL

A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.

B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

3.3 REPORT

A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.

B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.

C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

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SECTION 01 91 00

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSIONING DESCRIPTION

A. This Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS shall form the basis of the construction phase commissioning process and procedures. The Commissioning Agent shall add, modify, and refine the commissioning procedures, as approved by the Department of Veterans Affairs (VA), to suit field conditions and actual manufacturer's equipment, incorporate test data and procedure results, and provide detailed scheduling for all commissioning tasks.

B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the Division 21, Division 22, Division 23, Division 26, Division 27, and 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 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 contact documents and according to the manufacturer's recommendations.
2. Verify and document proper integrated performance of equipment and systems.
3. Verify that Operations & Maintenance documentation is complete.
4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
5. Verify that the VA's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
6. Document the successful achievement of the commissioning objectives listed above.

F. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

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 Contracting officer representative as the designated representative of the Contracting Officer. On this project, the authority to modify the contract in any way is strictly limited to the authority of the Contracting Officer.

B. In this project, only two contract parties are recognized and communications on contractual issues are strictly limited to VA Contracting officer representative 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 Contracting officer representative 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 Contracting officer representative.

C. Whole Building 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 Contracting officer representative. 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 Contracting officer representative 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 Contracting officer representative to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or Contracting officer representative will issue an official directive to this effect.
4. All parties to the Commissioning Process shall be individually responsible for alerting the Contracting officer representative 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 Contracting officer representative, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

1.3 RELATED WORK

A. Section 01 00 00 GENERAL REQUIREMENTS.

B. Section 01 32.16.16 NETWORK ANALYSIS SCHEDULES
C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
D. Section 21 08 00 COMMISSIONING OF FIRE PROTECTION SYSTEMS.
E. Section 22 08 00 COMMISSIONING OF PLUMBING SYSTEMS.
F. Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.
G. Section 26 08 00 COMMISSIONING OF ELECTRICAL SYSTEMS.
H. Section 27 08 00 COMMISSIONING OF COMMUNICATIONS SYSTEMS.
I. Section 28 08 00 COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS.

1.4 SUMMARY

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

List of Acronyms	
Acronym	Meaning
A/E	Architect / Engineer Design Team
AHJ	Authority Having Jurisdiction
ASHRAE	Association Society for Heating Air Condition and Refrigeration Engineers
BOD	Basis of Design
BSC	Building Systems Commissioning
CCTV	Closed Circuit Television
CD	Construction Documents
CMMS	Computerized Maintenance Management System
CO	Contracting Officer (VA)

List of Acronyms	
Acronym	Meaning
COR	Contracting Officer's Representative (see also VA-RE)
COBie	Construction Operations Building Information Exchange
CPC	Construction Phase Commissioning
Cx	Commissioning
CxA	Commissioning Agent
CxM	Commissioning Manager
CxR	Commissioning Representative
DPC	Design Phase Commissioning
FPT	Functional Performance Test
GBI-GG	Green Building Initiative - Green Globes
HVAC	Heating, Ventilation, and Air Conditioning
LEED	Leadership in Energy and Environmental Design
NC	Department of Veterans Affairs National Cemetery
NCA	Department of Veterans Affairs National Cemetery Administration
NEBB	National Environmental Balancing Bureau
O&M	Operations & Maintenance
OPR	Owner's Project Requirements
PFC	Pre-Functional Checklist
PFT	Pre-Functional Test
SD	Schematic Design
SO	Site Observation
TAB	Test Adjust and Balance
VA	Department of Veterans Affairs
VAMC	VA Medical Center
VA CFM	VA Office of Construction and Facilities Management
VACO	VA Central Office
VA PM	VA Project Manager
VA-RE	VA Contracting officer representative
USGBC	United States Green Building Council

1.6 DEFINITIONS

Acceptance Phase Commissioning: Commissioning tasks executed after most construction has been completed, most Site Observations and Static

Tests have been completed and Pre-Functional Testing has been completed and accepted. The main commissioning activities performed during this phase are verification that the installed systems are functional by conducting Systems Functional Performance tests and Owner Training.

Accuracy: The capability of an instrument to indicate the true value of a measured quantity.

Back Check: A back check is a verification that an agreed upon solution to a design comment has been adequately addressed in a subsequent design review

Basis of Design (BOD): The Engineer's Basis of Design is comprised of two components: the Design Criteria and the Design Narrative, these documents record the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements (OPR) and to satisfy applicable regulatory requirements, standards, and guidelines.

Benchmarks: Benchmarks are the comparison of a building's energy usage to other similar buildings and to the building itself.. For example, ENERGY STAR Portfolio Manager is a frequently used and nationally recognized building energy benchmarking tool.

Building Information Modeling (BIM): Building Information Modeling is a parametric database which allows a building to be designed and constructed virtually in 3D, and provides reports both in 2D views and as schedules. This electronic information can be extracted and reused for pre-populating facility management CMMS systems. Building Systems Commissioning (BSC): NEBB acronym used to designate its commissioning program.

Calibrate: The act of comparing an instrument of unknown accuracy with a standard of known accuracy to detect, correlate, report, or eliminate by adjustment any variation in the accuracy of the tested instrument.

CCTV: Closed circuit Television. Normally used for security surveillance and alarm detections as part of a special electrical security system.

COBie: Construction Operations Building Information Exchange (COBie) is an electronic industry data format used to transfer information developed during design, construction, and commissioning into the Computer Maintenance Management Systems (CMMS) used to operate facilities. See the Whole Building Design Guide website for further information (http://www.wbdg.org/resources/cobie.php)

Commissionability: Defines a design component or construction process that has the necessary elements that will allow a system or component to be effectively measured, tested, operated and commissioned

Commissioning Agent (CxA): The qualified Commissioning Professional who administers the Cx process by managing the Cx team and overseeing the Commissioning Process. Where CxA is used in this specification it means the Commissioning Agent, members of his staff or appointed members of the commissioning team. Note that LEED uses the term Commissioning Authority in lieu of Commissioning Agent.

Commissioning Checklists: Lists of data or inspections to be verified to ensure proper system or component installation, operation, and function. Verification checklists are developed and used during all phases of the commissioning process to verify that the Owner's Project Requirements (OPR) is being achieved.

Commissioning Design Review: The commissioning design review is a collaborative review of the design professionals design documents for items pertaining to the following: owner's project requirements; basis of design; operability and maintainability (O&M) including documentation; functionality; training; energy efficiency, control systems' sequence of operations including building automation system features; commissioning specifications and the ability to functionally test the systems.

Commissioning Issue: A condition identified by the Commissioning Agent or other member of the Commissioning Team that adversely affects the commissionability, operability, maintainability, or functionality of a system, equipment, or component. A condition that is in conflict with the Contract Documents and/or performance requirements of the installed systems and components. (See also – Commissioning Observation).

Commissioning Manager (CxM): A qualified individual appointed by the Contractor to manage the commissioning process on behalf of the Contractor.

Commissioning Observation: An issue identified by the Commissioning Agent or other member of the Commissioning Team that does not conform to the project OPR, contract documents or standard industry best practices. (See also Commissioning Issue)

Commissioning Plan: A document that outlines the commissioning process, commissioning scope and defines responsibilities, processes, schedules, and the documentation requirements of the Commissioning Process.

Commissioning Process: A quality focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems, components, and assemblies are planned, designed, installed, tested, can be operated, and maintained to meet the Owner's Project Requirements.

Commissioning Report: The final commissioning document which presents the commissioning process results for the project. Cx reports include an executive summary, the commissioning plan, issue log, correspondence, and all appropriate check sheets and test forms.

Commissioning Representative (CxR): An individual appointed by a sub-contractor to manage the commissioning process on behalf of the sub-contractor.

Commissioning Specifications: The contract documents that detail the objective, scope and implementation of the commissioning process as developed in the Commissioning Plan.

Commissioning Team: Individual team members whose coordinated actions are responsible for implementing the Commissioning Process.

Construction Phase Commissioning: All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

Contract Documents (CD): Contract documents include design and construction contracts, price agreements and procedure agreements. Contract Documents also include all final and complete drawings, specifications and all applicable contract modifications or supplements.

Construction Phase Commissioning (CPC): All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

Coordination Drawings: Drawings showing the work of all trades that are used to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers’ recommended maintenance clearances. On mechanical projects, coordination drawings include structural steel,

ductwork, major piping and electrical conduit and show the elevations and locations of the above components.

Data Logging: The monitoring and recording of temperature, flow, current, status, pressure, etc. of equipment using stand-alone data recorders.

Deferred System Test: Tests that cannot be completed at the end of the acceptance phase due to ambient conditions, schedule issues or other conditions preventing testing during the normal acceptance testing period.

Deficiency: See "Commissioning Issue".

Design Criteria: A listing of the VA Design Criteria outlining the project design requirements, including its source. These are used during the design process to show the design elements meet the OPR.

Design Intent: The overall term that includes the OPR and the BOD. It is a detailed explanation of the ideas, concepts, and criteria that are defined by the owner to be important. The design intent documents are utilized to provide a written record of these ideas, concepts and criteria.

Design Narrative: A written description of the proposed design solutions that satisfy the requirements of the OPR.

Design Phase Commissioning (DPC): All commissioning tasks executed during the design phase of the project.

Environmental Systems: Systems that use a combination of mechanical equipment, airflow, water flow and electrical energy to provide heating, ventilating, air conditioning, humidification, and dehumidification for the purpose of human comfort or process control of temperature and humidity.

Executive Summary: A section of the Commissioning report that reviews the general outcome of the project. It also includes any unresolved issues, recommendations for the resolution of unresolved issues and all deferred testing requirements.

Functionality: This defines a design component or construction process which will allow a system or component to operate or be constructed in a manner that will produce the required outcome of the OPR.

Functional Test Procedure (FTP): A written protocol that defines methods, steps, personnel, and acceptance criteria for tests conducted

on components, equipment, assemblies, systems, and interfaces among systems.

Industry Accepted Best Practice: A design component or construction process that has achieved industry consensus for quality performance and functionality. Refer to the current edition of the NEBB Design Phase Commissioning Handbook for examples.

Installation Verification: Observations or inspections that confirm the system or component has been installed in accordance with the contract documents and to industry accepted best practices.

Integrated System Testing: Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.

Issues Log: A formal and ongoing record of problems or concerns – and their resolution – that have been raised by members of the Commissioning Team during the course of the Commissioning Process.

Lessons Learned Workshop: A workshop conducted to discuss and document project successes and identify opportunities for improvements for future projects.

Maintainability: A design component or construction process that will allow a system or component to be effectively maintained. This includes adequate room for access to adjust and repair the equipment. Maintainability also includes components that have readily obtainable repair parts or service.

Manual Test: Testing using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the 'observation').

Owner's Project Requirements (OPR): A written document that details the project requirements and the expectations of how the building and its

systems will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

Peer Review: A formal in-depth review separate from the commissioning review processes. The level of effort and intensity is much greater than a typical commissioning facilitation or extended commissioning review. The VA usually hires an independent third-party (called the IDIQ A/E) to conduct peer reviews.

Precision: The ability of an instrument to produce repeatable readings of the same quantity under the same conditions. The precision of an instrument refers to its ability to produce a tightly grouped set of values around the mean value of the measured quantity.

Pre-Design Phase Commissioning: Commissioning tasks performed prior to the commencement of design activities that includes project programming and the development of the commissioning process for the project

Pre-Functional Checklist (PFC): A form used by the contractor to verify that appropriate components are onsite, correctly installed, set up, calibrated, functional and ready for functional testing.

Pre-Functional Test (PFT): An inspection or test that is done before functional testing. PFT's include installation verification and system and component start up tests.

Procedure or Protocol: A defined approach that outlines the execution of a sequence of work or operations. Procedures are used to produce repeatable and defined results.

Range: The upper and lower limits of an instrument's ability to measure the value of a quantity for which the instrument is calibrated.

Resolution: This word has two meanings in the Cx Process. The first refers to the smallest change in a measured variable that an instrument can detect. The second refers to the implementation of actions that correct a tested or observed deficiency.

Site Observation Visit: On-site inspections and observations made by the Commissioning Agent for the purpose of verifying component, equipment, and system installation, to observe contractor testing, equipment start-up procedures, or other purposes.

Site Observation Reports (SO): Reports of site inspections and observations made by the Commissioning Agent. Observation reports are

intended to provide early indication of an installation issue which will need correction or analysis.

Special System Inspections: Inspections required by a local code authority prior to occupancy and are not normally a part of the commissioning process.

Static Tests: Tests or inspections that validate a specified static condition such as pressure testing. Static tests may be specification or code initiated.

Start Up Tests: Tests that validate the component or system is ready for automatic operation in accordance with the manufactures requirements.

Systems Manual: A system-focused composite document that includes all information required for the owners operators to operate the systems.

Test Procedure: A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

Testing: The use of specialized and calibrated instruments to measure parameters such as: temperature, pressure, vapor flow, air flow, fluid flow, rotational speed, electrical characteristics, velocity, and other data in order to determine performance, operation, or function.

Testing, Adjusting, and Balancing (TAB): A systematic process or service applied to heating, ventilating and air-conditioning (HVAC) systems and other environmental systems to achieve and document air and hydronic flow rates. The standards and procedures for providing these services are referred to as "Testing, Adjusting, and Balancing" and are described in the Procedural Standards for the Testing, Adjusting and Balancing of Environmental Systems, published by NEBB or AABC.

Thermal Scans: Thermographic pictures taken with an Infrared Thermographic Camera. Thermographic pictures show the relative temperatures of objects and surfaces and are used to identify leaks, thermal bridging, thermal intrusion, electrical overload conditions, moisture containment, and insulation failure.

Training Plan: A written document that details, in outline form the expectations of the operator training. Training agendas should include instruction on how to obtain service, operate, startup, shutdown and maintain all systems and components of the project.

Trending: Monitoring over a period of time with the building automation system.

Unresolved Commissioning Issue: Any Commissioning Issue that, at the time that the Final Report or the Amended Final Report is issued that has not been either resolved by the construction team or accepted by the VA. Validation: The process by which work is verified as complete and operating correctly:

1. First party validation occurs when a firm or individual verifying the task is the same firm or individual performing the task.
2. Second party validation occurs when the firm or individual verifying the task is under the control of the firm performing the task or has other possibilities of financial conflicts of interest in the resolution (Architects, Designers, General Contractors and Third Tier Subcontractors or Vendors).
3. Third party validation occurs when the firm verifying the task is not associated with or under control of the firm performing or designing the task.

Verification: The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

Warranty Phase Commissioning: Commissioning efforts executed after a project has been completed and accepted by the Owner. Warranty Phase Commissioning includes follow-up on verification of system performance, measurement and verification tasks and assistance in identifying warranty issues and enforcing warranty provisions of the construction contract.

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

Whole Building Commissioning: Commissioning of building systems such as Building Envelope, HVAC, Electrical, Special Electrical (Fire Alarm, Security & Communications), Plumbing and Fire Protection as described in this specification.

1.7 SYSTEMS TO BE COMMISSIONED

A. Commissioning of a system or systems specified for this project is part of the construction process. Documentation and testing of these

systems, as well as training of the VA's Operation and Maintenance personnel, is required in cooperation with the VA and the Commissioning Agent.

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

Systems To Be Commissioned	
System	**Description**
Plumbing	
Domestic Water Distribution	Backflow preventers
Medical Air Systems	Outlet certification, cross-connection verification
Medical Vacuum Systems	O certification, cross-connection verification
Waste Anesthesia Gas Systems	Outlet certification, cross-connection verification
Medical Gas Systems (other than Medical Air Systems)	Outlet certification, cross-connection verification
HVAC	
Direct Digital Control System**	Operator Interface Computer, Operator Work Station (including graphics, point mapping, trends, alarms), Network Communications Modules and Wiring, Integration Panels.
HVAC Ventilation/Exhaust Systems	General exhaust, toilet exhaust, laboratory exhaust, isolation exhaust, room pressurization control systems, air handling units
HVAC Terminal Unit Systems**	VAV Terminal Units, CAV terminal units, fan coil units, fin-tube radiation, unit heaters
Humidity Control Systems	Humidifiers, controls, interface with facility DDC
Hydronic Distribution Systems	Pumps, DDC control panels, heat exchangers,
Electrical	

Systems To Be Commissioned	
System	**Description**
Grounding & Bonding Systems	Witness 3rd party testing, review reports
Electrical System Protective Device Study	Review reports, verify field settings consistent with Study
Low-Voltage Distribution System	Normal power distribution system, Life-safety power distribution system, critical power distribution system, equipment power distribution system, switchboards, distribution panels, panelboards, verify breaker testing results (injection current, etc)
Lighting & Lighting Control** Systems	Emergency lighting, occupancy sensors, lighting control systems, architectural dimming systems
Communications	
Structured Cabling System	Witness 3rd party testing, review reports
Public Address & Mass Notification Systems	Witness 3rd party testing, review reports
Nurse Call & Code Blue Systems	Witness 3rd party testing, review reports
Security Emergency Call Systems	Witness 3rd party testing, review reports
Electronic Safety and Security	
Physical Access Control Systems	Witness 3rd party testing, review reports
Access Control Systems	Witness 3rd party testing, review reports
Security Access Detection Systems	Witness 3rd party testing, review reports
Fire Detection and Alarm System	100% device acceptance testing, battery draw-down test, verify system monitoring, verify interface with other systems.
Integrated Systems Tests	

Systems To Be Commissioned	
System	**Description**
Fire Alarm Response	Integrated System Response to Fire Alarm Condition and Return to Normal
Table Notes	
** Denotes systems that LEED requires to be commissioned to comply with the LEED Fundamental Commissioning pre-requisite.	

1.8 COMMISSIONING TEAM

A. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project Superintendent and subcontractors, installers, schedulers, suppliers, and specialists deemed appropriate by the Department of Veterans Affairs (VA) and Commissioning Agent.

B. Members Appointed by Contractor:

1. Contractor' Commissioning Manager: 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.

C. 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. User: Representatives of the facility user and operation and maintenance personnel.
3. A/E: Representative of the Architect and engineering design professionals.

1.9 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.

1.10 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

A. The Contractor shall assign a Commissioning Manager 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 representatives with expertise and authority to act on behalf of the subcontractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:

1. Participate in commissioning coordination meetings.
2. Conduct operation and maintenance training sessions in accordance with approved training plans.
3. Verify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
4. Evaluate commissioning issues and commissioning observations identified in the Commissioning Issues Log, field reports, test reports or other commissioning documents. In collaboration with entity responsible for system and equipment installation, recommend corrective action.
5. Review and comment on commissioning documentation.
6. Participate in meetings to coordinate Systems Functional Performance Testing.

7. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to Commissioning Agent for incorporation into the commissioning plan.
8. Provide information to the Commissioning Agent for developing commissioning plan.
9. Participate in training sessions for VA's operation and maintenance personnel.
10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures to conduct Systems Functional Performance Testing of installed systems.

1.11 COMMISSIONING AGENT'S RESPONSIBILITIES

A. Organize and lead the commissioning team.

B. Prepare the commissioning plan. 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. Operation and maintenance documentation requirements are specified in Paragraph Section 01 00 00 GENERAL REQUIREMENTS.

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.

1.12 COMMISSIONING DOCUMENTATION

A. Commissioning Plan: A document, prepared by Commissioning Agent, that outlines the schedule, allocation of resources, and documentation

requirements of the commissioning process, and shall include, but is not limited, to the following:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
3. Identification of systems and equipment to be commissioned.
4. Schedule of Commissioning Coordination meetings.
5. Identification of items that must be completed before the next operation can proceed.
6. Description of responsibilities of commissioning team members.
7. Description of observations to be made.
8. Description of requirements for operation and maintenance training.
9. Schedule for commissioning activities with dates coordinated with overall construction schedule.
10. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
11. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
12. Preliminary Systems Functional Performance Test procedures.

B. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for each system to be commissioned, including subsystems, or equipment and interfaces or interlocks with other systems. Systems Functional Performance Test Procedures will include a separate entry, with space for comments, for each item to be tested. Preliminary Systems Functional Performance Test Procedures will be provided to the VA, Architect/Engineer, and Contractor for review and comment. The Systems Performance Test Procedure will include test procedures for each mode of operation and provide space to indicate whether the mode under test responded as required. Each System Functional Performance Test

procedure, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:

1. Name and identification code of tested system.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Dated signatures of the person performing test and of the witness, if applicable.
6. Individuals present for test.
7. Observations and Issues.
8. Issue number, if any, generated as the result of test.

C. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent will spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.

D. Test and Inspection Reports: The Commissioning Agent will record test data, observations, and measurements on Systems Functional Performance Test Procedure. The report will also include recommendation for system acceptance or non-acceptance. Photographs, forms, and other means appropriate for the application shall be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

E. Corrective Action Documents: The Commissioning Agent will document corrective action taken for systems and equipment that fail tests. The documentation will include any required modifications to systems and equipment and/or revisions to test procedures, if any. The Commissioning Agent will witness and document any retesting of systems and/or equipment requiring corrective action and document retest results. The Contractor shall be liable for the cost to the VA for the Commissioning Agent witnessing and documenting as a result of failed tests.

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

1. Creating an Commissioning Issues Log Entry:
   a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
   b. Assign a descriptive title for the issue.
   c. Identify date and time of the issue.
   d. Identify test number of test being performed at the time of the observation, if applicable, for cross reference.
   e. Identify system, subsystem, and equipment to which the issue applies.
   f. Identify location of system, subsystem, and equipment.
   g. Include information that may be helpful in diagnosing or evaluating the issue.
   h. Note recommended corrective action.
   i. Identify commissioning team member responsible for corrective action.
   j. Identify expected date of correction.
   k. Identify person that identified the issue.
2. Documenting Issue Resolution:
   a. Log date correction is completed or the issue is resolved.
   b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
   c. Identify changes to the Contract Documents that may require action.
   d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
   e. Identify person(s) who corrected or resolved the issue.

f. Identify person(s) verifying the issue resolution.

G. Final Commissioning Report: The Commissioning Agent will document results of the commissioning process, including unresolved issues, and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been properly installed and are performing according to the Contract Documents. This report will be used by the Department of Veterans Affairs when determining that systems will be accepted. This report will be used to evaluate systems, subsystems, and equipment and will serve as a future reference document during VA occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents and those that do not meet requirements of the Contract Documents. The commissioning report will include, but is not limited to, the following:

1. Lists and explanations of substitutions; compromises; variances with the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. Design Narrative documentation maintained by the Commissioning Agent.
2. Commissioning plan.
3. Pre-Functional Checklists completed by the Contractor, with annotation of the Commissioning Agent review and spot check.
4. Systems Functional Performance Test Procedures, with annotation of test results and test completion.
5, Commissioning Issues Log.
6. Listing of deferred and off season test(s) not performed, including the schedule for their completion.

1.13 SUBMITTALS

A. Preliminary Commissioning Plan Submittal: The Commissioning Agent has prepared a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan is included as an Appendix to this specification section. The Preliminary Commissioning Plan is provided for information only. It contains preliminary information about the following commissioning activities:

1. The Commissioning Team: A list of commissioning team members by organization.
2. Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list also provides preliminary

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

3. Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.
4. Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.
5. Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.
6. Pre-Functional Checklists: Preliminary Pre-Functional Checklists for equipment, components, subsystems, and systems to be commissioned. These Preliminary Pre-Functional Checklists provide guidance on the level of detailed information the Contractor shall include on the final submission.
7. Systems Functional Performance Test Procedures: Preliminary step-by-step System Functional Performance Test Procedures to be used during Systems Functional Performance Testing. These Preliminary Systems Functional Performance procedures provide information on the level of testing rigor, and the level of Contractor support required during performance of system’s testing.

B. Final Commissioning Plan Submittal: Based on the Final Construction Documents and the Contractor’s project team, the Commissioning Agent will prepare the Final Commissioning Plan as described in this section. The Commissioning Agent will submit three hard copies and three sets of electronic files of Final Commissioning Plan. The Contractor shall review the Commissioning Plan and provide any comments to the VA. The Commissioning Agent will incorporate review comments into the Final Commissioning Plan as directed by the VA.

C. Systems Functional Performance Test Procedure: The Commissioning Agent will submit preliminary Systems Functional Performance Test Procedures to the Contractor, and the VA for review and comment. The Contractor shall return review comments to the VA and the Commissioning Agent. The VA will also return review comments to the Commissioning Agent. The

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

D. Pre-Functional Checklists: The Commissioning Agent will submit Pre-Functional Checklists to be completed by the Contractor.

E. Test and Inspection Reports: The Commissioning Agent will submit test and inspection reports to the VA with copies to the Contractor and the Architect/Engineer.

F. Corrective Action Documents: The Commissioning Agent will submit corrective action documents to the VA Contracting officer representative 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.
2. The Commissioning Agent may request further documentation as is necessary for the commissioning process or to support other VA data collection requirements, including Construction Operations Building Information Exchange (COBIE), Building Information Modeling (BIM), etc.

1.14 COMMISSIONING PROCESS

A. The Commissioning Agent will be responsible for the overall management of the commissioning process as well as coordinating scheduling of commissioning tasks with the VA and the Contractor. As directed by the VA, the Contractor shall incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.

B. Within 7 days of contract award, the Contractor shall designate a specific individual as the Commissioning Manager (CxM) to manage and lead the commissioning effort on behalf of the Contractor. The Commissioning Manager shall be the single point of contact and communications for all commissioning related services by the Contractor.

C. Within 7 days of contract award, the Contractor shall ensure that each subcontractor designates specific individuals as Commissioning Representatives (CXR) to be responsible for commissioning related tasks. The Contractor shall ensure the designated Commissioning Representatives participate in the commissioning process as team members providing commissioning testing services, equipment operation, adjustments, and corrections if necessary. The Contractor shall ensure that all Commissioning Representatives shall have sufficient authority to direct their respective staff to provide the services required, and to speak on behalf of their organizations in all commissioning related contractual matters.

1.15 QUALITY ASSURANCE

A. Instructor Qualifications: Factory authorized service representatives shall be experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.

B. Test Equipment Calibration: The Contractor shall comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

1.16 COORDINATION

A. Management: The Commissioning Agent will coordinate the commissioning activities with the VA and Contractor. The Commissioning Agent will submit commissioning documents and information to the VA. All commissioning team members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.

B. Scheduling: The Contractor shall work with the Commissioning Agent and the VA to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient

information (including, but not limited to, tasks, durations and predecessors) on commissioning activities to allow the Contractor and the VA to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction as directed by the VA.

C. Initial Schedule of Commissioning Events: The Commissioning Agent will provide the initial schedule of primary commissioning events in the Commissioning Plan and at the commissioning coordination meetings. The Commissioning Plan will provide a format for this schedule. As construction progresses, more detailed schedules will be developed by the Contractor with information from the Commissioning Agent.

D. Commissioning Coordinating Meetings: The Commissioning Agent will conduct periodic Commissioning Coordination Meetings of the commissioning team to review status of commissioning activities, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.

E. Pretesting Meetings: The Commissioning Agent will conduct pretest meetings of the commissioning team to review startup reports, Pre-Functional Checklist results, Systems Functional Performance Testing procedures, testing personnel and instrumentation requirements.

F. Systems Functional Performance Testing Coordination: The Contractor shall coordinate testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. The Contractor shall coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. The Contractor shall provide all standard and specialized testing equipment required to perform Systems Functional Performance Testing.

B. Data logging equipment and software required to test equipment shall be provided by the Contractor.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall

have a certified calibration within the past year to an accuracy of 0.5 °C (1.0 °F) and a resolution of + or - 0.1 °C (0.2 °F). Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and following any repairs to the equipment. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

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

Spec Writer's Notes: Edit the following tables to describe the roles and responsibilities for each commissioning team member for each of the commissioning tasks as appropriate for the project.

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

Construction Phase		CxA = Commissioning Agent COR = Contracting officer representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Schedules	Duration Schedule for Commissioning Activities	L	A	R	R	N/A	
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O	
Document Reviews	TAB Plan Review	L	A	R	R	O	
	Submittal and Shop Drawing Review	R	A	R	L	O	
	Review Contractor Equipment Startup Checklists	L	A	R	R	N/A	
	Review Change Orders, ASI, and RFI	L	A	R	R	N/A	
Site Observations	Witness Factory Testing	P	A	P	L	O	
	Construction Observation Site Visits	L	A	R	R	O	
Functional Test Protocols	Final Pre-Functional Checklists	L	A	R	R	O	
	Final Functional Performance Test Protocols	L	A	R	R	O	

Construction Phase		CxA = Commissioning Agent COR = Contracting officer representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	

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

Acceptance Phase		CxA = Commissioning Agent COR = Contracting officer representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Meetings	Commissioning Meetings	L	A	P	P	O	
	Project Progress Meetings	P	A	P	L	O	
	Pre-Test Coordination Meeting	L	A	P	P	O	

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

Acceptance Phase		CxA = Commissioning Agent COR = Contracting officer representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Site Observations	Construction Observation Site Visits	L	A	R	R	O	
	Witness Selected Equipment Startup	L	A	R	R	O	
Functional Test Protocols	TAB Verification	L	A	R	R	O	
	Systems Functional Performance Testing	L	A	P	P	P	
	Retesting	L	A	P	P	P	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
	Systems Training	L	S	R	P	P	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	
	Final Commissioning Report	L	A	R	R	R	
	Prepare Systems Manuals	L	A	R	R	R	

3.2 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS

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

1. Pre-Functional Checklists are important to ensure that the equipment and systems are hooked up and operational. These ensure that Systems Functional Performance Testing may proceed without unnecessary delays. Each system to be commissioned shall have a full Pre-Functional Checklist completed by the Contractor prior to Systems Functional Performance Testing. No sampling strategies are used.
   a. The Pre-Functional Checklist will identify the trades responsible for completing the checklist. The Contractor shall ensure the appropriate trades complete the checklists.
   b. The Commissioning Agent will review completed Pre-Functional Checklists and field-verify the accuracy of the completed checklist using sampling techniques.
2. Startup and Initial Checkout Plan: The Contractor shall develop detailed startup plans for all equipment. The primary role of the Contractor in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for startup shall be identified in the Startup Plan and in the checklist forms.
   a. The Contractor shall develop the full startup plan by combining (or adding to) the checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual data and the field checkout sheets normally used by the Contractor. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
   b. The full startup plan shall at a minimum consist of the following items:
      1) The Pre-Functional Checklists.
      2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
      3) The manufacturer's normally used field checkout sheets.

c. The Commissioning Agent will submit the full startup plan to the VA and Contractor for review. Final approval will be by the VA.
d. The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.

3. Sensor and Actuator Calibration
   a. All field installed temperature, relative humidity, CO2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described in Division 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.

3.3 DEFICIENCIES, NONCONFORMANCE, AND APPROVAL IN CHECKLISTS AND STARTUP

A. The Contractor shall clearly list any outstanding items of the initial startup and Pre-Functional Checklist procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies shall be provided to the VA and the Commissioning Agent within two days of completion.

B. The Commissioning Agent will review the report and submit comments to the VA. The Commissioning Agent will work with the Contractor to correct and verify deficiencies or uncompleted items. The Commissioning Agent will involve the VA and others as necessary. The Contractor shall correct all areas that are noncompliant or incomplete in the checklists in a timely manner, and shall notify the VA and Commissioning Agent as soon as outstanding items have been corrected. The Contractor shall submit an updated startup report and a Statement of Correction on the original noncompliance report. When satisfactorily completed, the Commissioning Agent will recommend approval of the checklists and startup of each system to the VA.

C. The Contractor shall be responsible for resolution of deficiencies as directed the VA.

3.4 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.

3.5 DDC SYSTEM TRENDING FOR COMMISSIONING

A. Trending is a method of testing as a standalone method or to augment manual testing. The Contractor shall trend any and all points of the system or systems at intervals specified below.

B. Alarms are a means to notify the system operator that abnormal conditions are present in the system. Alarms shall be structured into three tiers – Critical, Priority, and Maintenance.

1. Critical alarms are intended to be alarms that require the immediate attention of and action by the Operator. These alarms shall be displayed on the Operator Workstation in a popup style window that is graphically linked to the associated unit's graphical display. The popup style window shall be displayed on top of any active window within the screen, including non DDC system software.
2. Priority level alarms are to be printed to a printer which is connected to the Operator’s Work Station located within the engineer’s office. Additionally Priority level alarms shall be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which shall require reaction from

the operator or maintenance personnel within a normal work shift, and not immediate action.

3. Maintenance alarms are intended to be minor issues which would require examination by maintenance personnel within the following shift. These alarms shall be generated in a scheduled report automatically by the DDC system at the start of each shift. The generated maintenance report will be printed to a printer located within the engineer's office.

C. The Contractor shall provide a wireless internet network in the building for use during controls programming, checkout, and commissioning. This network will allow project team members to more effectively program, view, manipulate and test control devices while being in the same room as the controlled device.

D. The Contractor shall provide graphical trending through the DDC control system of systems being commissioned. Trending requirements are indicated below and included with the Systems Functional Performance Test Procedures. Trending shall occur before, during and after Systems Functional Performance Testing. The Contractor shall be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steady state conditions as well as during the System Functional Testing. These graphical reports shall be submitted to the Contracting officer representative and Commissioning Agent for review and analysis before, during dynamic operation, and after Systems Functional Performance Testing. The Contractor shall provide, but not limited to, the following trend requirements and trend submissions:

1. Pre-testing, Testing, and Post-testing – Trend reports of trend logs and graphical trend plots are required as defined by the Commissioning Agent. The trend log points, sampling rate, graphical plot configuration, and duration will be dictated by the Commissioning Agent. At any time during the Commissioning Process the Commissioning Agent may recommend changes to aspects of trending as deemed necessary for proper system analysis. The Contractor shall implement any changes as directed by the Contracting officer representative. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the

Contractor, as directed by the Contracting officer representative, prior to the execution of Systems Functional Performance Testing.

2. Dynamic plotting – The Contractor shall also provide dynamic plotting during Systems Functional Performance testing at frequent intervals for points determined by the Systems Functional Performance Test Procedure. The graphical plots will be formatted and plotted at durations listed in the Systems Functional Performance Test Procedure.
3. Graphical plotting - The graphical plots shall be provided with a dual y-axis allowing 15 or more trend points (series) plotted simultaneously on the graph with each series in distinct color. The plots will further require title, axis naming, legend etc. all described by the Systems Functional Performance Test Procedure. If this cannot be sufficiently accomplished directly in the Direct Digital Control System then it is the responsibility of the Contractor to plot these trend logs in Microsoft Excel.
4. The following tables indicate the points to be trended and alarmed by system. The Operational Trend Duration column indicates the trend duration for normal operations. The Testing Trend Duration column indicates the trend duration prior to Systems Functional Performance Testing and again after Systems Functional Performance Testing. The Type column indicates point type: AI = Analog Input, AO = Analog Output, DI = Digital Input, DO = Digital Output, Calc = Calculated Point. In the Trend Interval Column, COV = Change of Value. The Alarm Type indicates the alarm priority; C = Critical, P = Priority, and M = Maintenance. The Alarm Range column indicates when the point is considered in the alarm state. The Alarm Delay column indicates the length of time the point must remain in an alarm state before the alarm is recorded in the DDC. The intent is to allow minor, short-duration events to be corrected by the DDC system prior to recording an alarm.

Dual-Path Air Handling Unit Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
OA Temperature	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 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		
Return Fan Speed	AI	15 Min	24 hours	3 days	N/A		
RA Pre-Filter Status	AI	None	None	None	N/A		
OA 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		
RA CHW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA CHW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA HW 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
Initial UVC Intensity (%)	AI	None	None	None	N/A		
Duct Pressure	AI	15 Min	24 hours	3 days	C	±25% from SP	6 min
CO2 Level	AI	15 Min	24 hours	3 days	P	±10% from SP	10 min
Supply Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Return Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 Min

Dual-Path Air Handling Unit Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
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
Freeze Stat Level 2	DI	COV	24 hours	3 days	C	True	5 min
Freeze Stat Level 3	DI	COV	24 hours	3 days	P	True	1 min
Fire/Smoke Damper Status	DI	COV	24 hours	3 days	P	Closed	1 min
Emergency AHU Shutdown	DI	COV	24 hours	3 days	P	True	1 min
Exhaust Fan #1 Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Exhaust Fan #2 Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Exhaust Fan #3 Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
OA Alarm	DI	COV	24 hours	3 days	C	True	10 min
High Static Alarm	DI	COV	24 hours	3 days	C	True	10 min
UVC Emitter Alarm	DI	COV	24 hours	3 days	P	True	10 min
CO2 Alarm	DI	COV	24 hours	3 days	P	True	10 min
Power Failure	DI	COV	24 hours	3 days	P	True	1 min
Supply Fan Speed	AO	15 Min	24 hours	3 days	N/A		
Return Fan Speed	AO	15 Min	24 hours	3 days	N/A		
RA CHW Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA CHW Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA HW Valve Position	AO	15 Min	24 hours	3 days	N/A		
Supply Fan S/S	DO	COV	24 hours	3 days	N/A		
Return Fan S/S	DO	COV	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**
Fire/Smoke Dampers	DO	COV	24 hours	3 days	N/A		
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
AHU Energy	Calc	1 Hour	30 day	N/A	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 Setpoint	AI	15 Min	12 hours	3 days	M	±10°F from SP	60 min
Space Humidity	AI	15 Min	12 hours	3 days	P	> 60% RH	5 min
Unoccupied Override	DI	COV	12 hours	3 days	M	N/A	12 Hours
Refrigerator Alarm	DI	COV	12 hours	3 days	C	N/A	10 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		

E. The Contractor shall provide the following information prior to Systems Functional Performance Testing. Any documentation that is modified

after submission shall be recorded and resubmitted to the Contracting officer representative and Commissioning Agent.

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

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

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

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

3.6 SYSTEMS FUNCTIONAL PERFORMANCE TESTING

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

B. Objectives and Scope: The objective of Systems Functional Performance Testing is to demonstrate that each system is operating according to the Contract Documents. Systems Functional Performance Testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of noncompliant performance are identified and corrected, thereby improving the operation and functioning of the systems. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, fire alarm and emergency power) where there is a specified system response. The Contractor shall verify each sequence in the sequences of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

C. Development of Systems Functional Performance Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor shall submit all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements found in the Contract Documents and approved submittals and shop drawings, the Commissioning Agent will develop specific Systems Functional Test Procedures to verify and document proper operation of each piece of equipment and system to be commissioned. The Contractor shall assist the Commissioning Agent in developing the Systems Functional Performance Test procedures as requested by the Commissioning Agent i.e. by answering questions about equipment, operation, sequences, etc. Prior to execution, the Commissioning Agent will provide a copy of the Systems Functional Performance Test procedures to the VA, the Architect/Engineer, and the Contractor, who shall review the tests for feasibility, safety, equipment and warranty protection.

D. Purpose of Test Procedures: The purpose of each specific Systems Functional Performance Test is to verify and document compliance with the stated criteria of acceptance given on the test form. Representative test formats and examples are found in the Commissioning Plan for this project. (The Commissioning Plan is issued as a separate document and is available for review.) The test procedure forms

developed by the Commissioning Agent will include, but not be limited to, the following information:

1. System and equipment or component name(s)
2. Equipment location and ID number
3. Unique test ID number, and reference to unique Pre-Functional Checklists and startup documentation, and ID numbers for the piece of equipment
4. Date
5. Project name
6. Participating parties
7. A copy of the specification section describing the test requirements
8. A copy of the specific sequence of operations or other specified parameters being verified
9. Formulas used in any calculations
10. Required pretest field measurements
11. Instructions for setting up the test.
12. Special cautions, alarm limits, etc.
13. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
14. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
15. A section for comments.
16. Signatures and date block for the Commissioning Agent. A place for the Contractor to initial to signify attendance at the test.

E. Test Methods: Systems Functional Performance Testing shall be achieved by manual testing (i.e. persons manipulate the equipment and observe performance) and/or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by standalone data loggers. The Contractor and Commissioning Agent shall determine which method is most appropriate for tests that do not have a method specified.

1. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, although timing the testing to experience actual conditions is encouraged wherever practical.
2. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading

in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

3. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
4. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the Air Conditioning compressor lockout initiate at an outside air temperature below 12 C (54 F), when the outside air temperature is above 12 C (54 F), temporarily change the lockout setpoint to be 2 C (4 F) above the current outside air temperature.
5. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification shall be completed during systems startup and initial checkout.

F. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.

G. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance

Test Procedures execution. The Commissioning Agent will determine the sampling rate. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.

H. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

I. Coordination and Scheduling: The Contractor shall provide a minimum of 7 days' notice to the Commissioning Agent and the VA regarding the completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Commissioning Agent will schedule Systems Functional Performance Tests with the Contractor and VA. The Commissioning Agent will witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.

J. Testing Prerequisites: In general, Systems Functional Performance Testing will be conducted only after Pre-Functional Checklists have been satisfactorily completed. The control system shall be sufficiently tested and approved by the Commissioning Agent and the VA before it is used to verify performance of other components or systems. The air balancing and water balancing shall be completed before Systems Functional Performance Testing of air-related or water-related equipment or systems are scheduled. Systems Functional Performance Testing will proceed from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems will be checked.

K. Problem Solving: The Commissioning Agent will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor.

3.7 DOCUMENTATION, NONCONFORMANCE AND APPROVAL OF TESTS

A. Documentation: The Commissioning Agent will witness, and document the results of all Systems Functional Performance Tests using the specific procedural forms developed by the Commissioning Agent for that purpose. Prior to testing, the Commissioning Agent will provide these forms to the VA and the Contractor for review and approval. The Contractor shall include the filled out forms with the O&M manual data.

B. Nonconformance: The Commissioning Agent will record the results of the Systems Functional Performance Tests on the procedure or test form. All items of nonconformance issues will be noted and reported to the VA on Commissioning Field Reports and/or the Commissioning Master Issues Log.

1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of noncompliance and resolution shall be documented on the Systems Functional Test Procedure.
2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the VA.
3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
4. When there is no dispute on an item of noncompliance, and the Contractor accepts responsibility to correct it:
   a. The Commissioning Agent will document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the Commissioning Agent will submit a Commissioning Field Report to the VA. The Commissioning Agent will also note items of noncompliance and the Contractor’s response in the Master Commissioning Issues Log. The Contractor shall correct the item of noncompliance and report completion to the VA and the Commissioning Agent.

b. The need for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.

5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:
   a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor’s response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.
   b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the Department of Veterans Affairs.
   c. The Commissioning Agent will document the resolution process.
   d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.

C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance specifications, all identical units may be considered unacceptable by the VA. In such case, the Contractor shall provide the VA with the following:

1. Within one week of notification from the VA, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the VA within two weeks of the original notice.
2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
3. The VA shall determine whether a replacement of all identical units or a repair is acceptable.
4. Two examples of the proposed solution shall be installed by the Contractor and the VA shall be allowed to test the installations for up to one week, upon which the VA will decide whether to accept the solution.
5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

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

3.8 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.

3.9 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 Contracting officer representative, 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, Division 28, and Division 31 sections. The Training and Demonstration shall include, but is not limited to, the following:

1. Review the Contract Documents.
2. Review installed systems, subsystems, and equipment.
3. Review instructor qualifications.
4. Review instructional methods and procedures.
5. Review training module outlines and contents.
6. Review course materials (including operation and maintenance manuals).
7. Review and discuss locations and other facilities required for instruction.
8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.

9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

C. Training Module Submittals: The Contractor shall submit the following information to the VA and the Commissioning Agent:

1. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module. At completion of training, submit two complete training manuals for VA's use.
2. Qualification Data: Submit qualifications for facilitator and/or instructor.
3. Attendance Record: For each training module, submit list of participants and length of instruction time.
4. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.
5. Demonstration and Training Recording:
   a. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
   b. Video Format: Provide high quality color DVD color on standard size DVD disks.
   c. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
   d. Narration: Describe scenes on video recording by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   e. Submit two copies within seven days of end of each training module.

6. 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. Include a cover sheet with same label information as the corresponding videotape. Include name of Project and date of videotape on each page.

D. Quality Assurance:

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

E. Training Coordination:

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

F. Instruction Program:

1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
   a. HVAC systems, including air handling equipment, air distribution systems, and terminal equipment and devices.
   b. HVAC instrumentation and controls.
   c. Electrical service and distribution, including switchgear, transformers, switchboards, panelboards, uninterruptible power supplies, and motor controls.

d. Lighting equipment and controls.

e. Communication systems, including intercommunication, surveillance, nurse call systems, public address, mass evacuation, 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. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Department of Veterans Affairs for number of participants, instruction times, and location.

b. Instructor: Engage qualified instructors to instruct VA's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1) The Commissioning Agent will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.

2) The VA will furnish an instructor to describe VA's operational philosophy.

3) The VA will furnish the Contractor with names and positions of participants.

3. Scheduling: Provide instruction at mutually agreed times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with the VA and the Commissioning Agent with at least seven days' advance notice.

4. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, or a written, performance-based test.

5. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

I. Demonstration and Training Recording:

1. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately.

Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.

2. Video Format: Provide high quality color DVD color on standard size DVD disks.
3. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
4. Narration: Describe scenes on videotape by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

----- END -----

SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

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, 02 82 13.13 GLOVEBAG ASBESTOS ABATEMENT, 02 82 13.19 ASBESTOS FLOOR TILE AND MASTIC ABATEMENT.

E. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

F. Construction Waste Management: Section 017419 CONSTRUCTION WASTE MANAGEMENT.

G. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7, INFECTION PREVENTION MEASURES.

1.3 PROTECTION:

A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.

B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.

C. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.

E. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.

F. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
   1. No wall or part of wall shall be permitted to fall outwardly from structures.
   2. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
   3. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.

G. Before beginning any demolition work, 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 COR. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have COR’s approval.

H. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

I. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7 INFECTION PREVENTION MEASURES.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 DEMOLITION:

A. 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 to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas

specified by the COR. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 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.

B. 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. The removal of hazardous material shall be referred to Hazardous Materials specifications.

C. Remove existing utilities as indicated or uncovered by work and terminate in s manner conforming to the nationally recognized code covering the specific utility and approved by the COR. When utility lines are encountered that are not indicated on the drawings, the COR shall be notified prior to further work in that area.

3.2 CLEAN-UP:

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

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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

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;
180 square feet of boiler breeching insulation enclosed in a metal jacket from the 6th floor roof

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 AND STEAM GENERATION.
F. 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 AND STEAM GENERATION
G. Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.
H. Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING / Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING / Section 22 05 33, HEAT TRACING FOR PLUMBING PIPING / Section 22 11 00, FACILITY WATER DISTRIBUTION / Section 22 13 00, FACILITY SANITARY SEWERAGE / Section 22 13 23, SANITARY WASTE INTERCEPTORS / Section 22 14 00, FACILITY

STORM DRAINAGE / Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES / Section 23 11 23, FACILITY NATURAL-GAS PIPING.

I. Section 23 21 13, HYDRONIC PIPING / Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING.

J. Section 23 31 00, HVAC DUCTS AND CASINGS / Section 23 37 00, AIR OUTLETS AND INLETS.

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, regulated area preparations, emergency procedures arrangements, and standard operating procedures for 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.

1.1.5 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 VA Design and Construction Procedures. VA Design and Construction Procedures 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

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 and accessibility to ACM. 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 ACM and those prices shall be used for additional work required under the contractor.

1.3 STOP ASBESTOS REMOVAL

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 it is 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 practical. The Contractor shall immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

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

1.4 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. 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 EPA.
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.
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).

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.

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.

1.4.3 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. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000

K. NEC National Electrical Code (by NFPA)

L. NEMA National Electrical Manufacturer's Association
2101 L Street, N.W.
Washington, DC 20037

M. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555

N. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236

O. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402

P. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800

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 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.

1.5.2 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITY

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

1.5.3 FEDERAL REQUIREMENTS

Federal requirements which govern 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 Subpart I - Personal Protective Equipment
3. Title 29 CFR 1910.134 - Respiratory Protection
4. Title 29 CFR 1926 - Construction Industry Standards
5. Title 29 CFR 1910.1020 - Access to Employee Exposure and Medical Records
6. Title 29 CFR 1910.1200 - Hazard Communication
7. Title 29 CFR 1910 Subpart K - 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:

ASBESTOS ABATEMENT CONTRACTOR LICENSING AND TRAINING, OHIO ADMINISTRATIVE CODE, RULES 3701-34-01 THROUGH 3701-34-7

1.5.5 LOCAL REQUIREMENTS

If 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 and ANSI 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 are 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, 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, 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.

1.5.12 EMERGENCY ACTION PLAN AND ARRANGEMENTS

A. An Emergency Action Plan shall be developed prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 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.

1.5.13 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 Ohio. 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;
   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(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.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

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

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

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

1.7.3 SELECTION AND USE OF RESPIRATORS

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

1.7.4 MINIMUM RESPIRATORY PROTECTION

Minimum respiratory protection shall be a full face powered air purifying respirator when fiber levels are maintained consistently at or below 0.5 f/cc. A higher level of respiratory protection may be

provided or required, depending on fiber levels. Respirator selection shall meet the requirements of 29 CFR 1926.1101 (h); Table 1, except as indicated in this paragraph. Abatement personnel must have a respirator for their exclusive use.

1.7.5 MEDICAL WRITTEN OPINION

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

1.7.6 RESPIRATOR FIT TEST

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

1.7.7 RESPIRATOR FIT CHECK

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

1.7.8 MAINTENANCE AND CARE OF RESPIRATORS

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

1.7.9 SUPPLIED AIR SYSTEMS

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

1.8 WORKER PROTECTION

1.8.1 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.

1.8.2 MEDICAL EXAMINATIONS

Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. A current physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the medical opinion the person has been evaluated for working in a heat and cold stress environment while wearing personal protective equipment (PPE) and is able to perform the work without risk of material health impairment.

1.8.3 REGULATED AREA ENTRY PROCEDURE

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

1.8.4 DECONTAMINATION PROCEDURE

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

A. When exiting the regulated area, remove disposable coveralls, and ALL other clothes, disposable head coverings, and foot coverings or boots in the equipment room.
B. Still wearing the respirator and completely naked, proceed to the shower. Showering is MANDATORY. Care must be taken to follow reasonable procedures in removing the respirator to avoid inhaling asbestos fibers while showering. The following procedure is required as a minimum:
   1. Thoroughly wet body including hair and face. If using a PAPR hold blower above head to keep filters dry.
   2. With respirator still in place, thoroughly decontaminate body, hair, respirator face piece, and all other parts of the respirator except the blower and battery pack on a PAPR. Pay particular attention to cleaning the seal between the face and respirator facepiece and under the respirator straps.
   3. Take a deep breath, hold it and/or exhale slowly, completely wetting hair, face, and respirator. While still holding breath, remove the respirator and hold it away from the face before starting to breathe.
C. Carefully decontaminate the facepiece of the respirator inside and out. If using a PAPR, shut down using the following sequence: a) first cap inlets to filters; b) turn blower off to keep debris collected on the inlet side of the filter from dislodging and contaminating the outside of the unit; c) thoroughly decontaminate blower and hoses; d) carefully decontaminate battery pack with a wet rag being cautious of getting water in the battery pack thus preventing destruction. **(THIS PROCEDURE IS NOT A SUBSTITUTE FOR RESPIRATOR CLEANING!)**
D. Shower and wash body completely with soap and water. Rinse thoroughly.
E. Rinse shower room walls and floor to drain prior to exiting.
F. Proceed from shower to clean room; dry off and change into street clothes or into new disposable work clothing.

1.8.5 REGULATED AREA REQUIREMENTS

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

1.9 DECONTAMINATION FACILITIES

1.9.1 DESCRIPTION

Provide each regulated area with separate personnel decontamination facilities (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF are the only means of ingress and egress to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the W/EDF.

1.9.2 GENERAL REQUIREMENTS

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

1.9.3 TEMPORARY FACILITIES TO THE PDF AND 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 overhead electric power with ground fault circuit interruption (GFCI) protection. Provide a sub-panel equipped with GFCI protection for all temporary power in the clean room. Provide adequate lighting to provide a minimum of 50 foot candles in the PDF and W/EDF. Provide temporary heat, if needed, to maintain 70°F throughout the PDF and W/EDF.

1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)

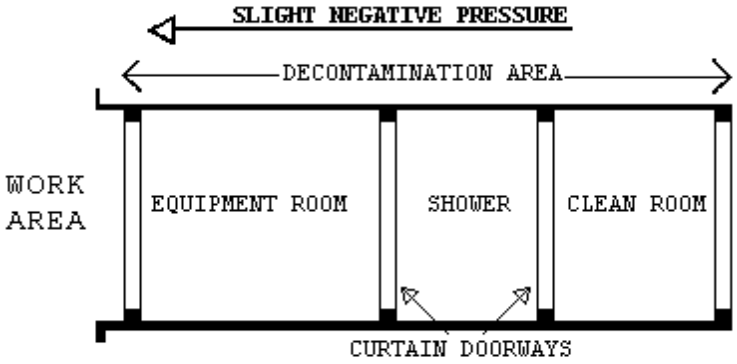
The Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room which is connected to the regulated area. The PDF must be sized to accommodate the number of personnel scheduled for the project. The shower room, located in the center of the PDF, shall be fitted with as many portable showers as necessary to insure all employees can complete the entire

decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.

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

wipe all surfaces of the equipment room after each shift change. Provide an additional loose layer of 6 mil fire retardant poly per shift change and remove this layer after each shift. If needed, provide a temporary electrical sub-panel equipped with GFCI in the equipment room to accommodate any equipment required in the regulated area.

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



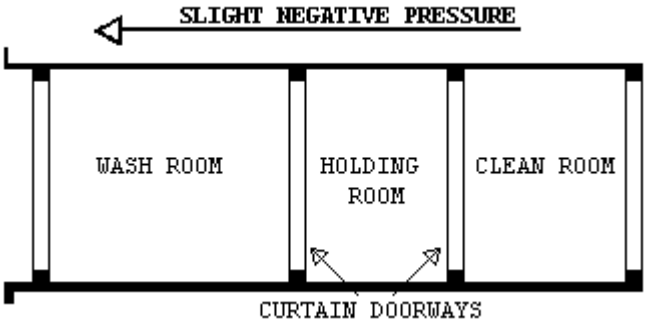
1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)

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 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

At the 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

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-mils. For floors and all other uses, sheeting of at least 6-mil shall be used in widths selected to minimize the frequency of joints. Fire retardant poly shall be used throughout.
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-start meeting 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).

2.2 MONITORING, INSPECTION AND TESTING

2.2.1 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 fiber 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.

2.2.2 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.

2.2.3 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH/CIH

The Contractor’s CPIH/CIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH/CIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor’s personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in sampling and analysis. The IH Technician shall have successfully completed a NIOSH 582 Course or equivalent and provide documentation. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing

program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA AHERA/State Contractor/Supervisor or Abatement Worker and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation on substantially similar projects in size and scope. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT and approved by the VA prior to start of the project. A daily log shall be maintained by the CPIH/CIH or IH Technician, documenting all OSHA requirements for air personal monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH upon request. The log will contain, at a minimum, information on personnel or area samples, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH/CIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH/CIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH/CIH responsibilities. Additionally, the CPIH/CIH will monitor and record pressure readings within the containment daily with a minimum of two readings at the beginning and at the end of a shift, and submit the data in the daily report.

2.3 ASBESTOS HAZARD ABATEMENT PLAN

The Contractor shall have established an 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 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 AHAPs 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

2.4 SUBMITTALS

2.4.1 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 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. Area or clearance air monitoring shall be conducted 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 AHAPs 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 AHAPs 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/IH's familiar with your air monitoring and standard operating procedures; 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.

2.4.2 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; and 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. Removal of any poly barriers.
   2. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
   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.

2.4.3 SUBMITTALS AT COMPLETION OF ABATEMENT

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

2.5 ENCAPSULANTS

2.5.1 TYPES OF ENCAPSULANTS

A. The following four types of encapsulants, if used, must comply with 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.

2.5.2 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/ft^2).

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/ft^2) (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.

2.5.3 CERTIFICATES OF COMPLIANCE

The Contractor shall submit to the VA representative certification from the manufacturer indicating compliance with performance requirements for encapsulants when applied according to manufacturer recommendations.

PART 3 - EXECUTION

3.1 REGULATED AREA PREPARATIONS

3.1.1 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.

3.1.2. SIGNAGE AND POWER MANAGEMENT

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.

3.1.3 NEGATIVE PRESSURE FILTRATION SYSTEM

The Contractor shall provide enough HEPA negative air machines to effect > - 0.02” WCG pressure. 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 > - 0.02” WCG pressure. 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 > - 0.02” WCG pressure. The contractor shall use 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.

3.1.3.1 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.

3.1.3.2 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 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.

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

3.1.3.3 PRESSURE DIFFERENTIAL

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

3.1.3.4 MONITORING

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

3.1.3.5 AUXILIARY GENERATOR

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

3.1.3.6 SUPPLEMENTAL MAKE-UP AIR INLETS

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

3.1.3.7 TESTING THE SYSTEM

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

3.1.3.8 DEMONSTRATION OF THE NEGATIVE PRESSURE FILTRATION 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.

3.1.3.9 USE OF THE NEGATIVE PRESSURE FILTRATION 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. Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area. After items have been pre-cleaned and decontaminated, they may be removed from the work area for storage until the completion of abatement in the work area.
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 successfully completed for that regulated area.

3.1.3.10 DISMANTLING THE SYSTEM

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

3.1.4 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

3.1.4.1 GENERAL

Seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All surfaces in the regulated area must be covered to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated as a result of the work, shall immediately stop work and clean up the contamination at no additional cost to the VA. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section 3.1.4.8; FIRESTOPPING.

3.1.4.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA

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

3.1.4.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

3.1.4.4 CRITICAL BARRIERS

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

3.1.4.5 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.

3.1.4.6 SECONDARY BARRIERS

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 and at a minimum once per work day.

3.1.4.7 EXTENSION OF THE REGULATED AREA

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

3.1.4.8 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.

3.1.5 SANITARY FACILITIES

The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

3.1.6 PERSONAL PROTECTIVE EQUIPMENT

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.

3.1.7 PRE-CLEANING

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.

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area. All workers performing pre-cleaning activities must don appropriate personal protective equipment (PPE), as specified throughout this document and as approved in the Contractor's work plan. After items have been pre-cleaned and decontaminated, they may be removed from the work area for storage until the completion of abatement in the work area.

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. Carpeting will be disposed of prior to abatement if in the regulated area. If ACM floor tile is attached to the carpet while the Contractor is removing the carpet that section of the carpet will be disposed of as asbestos waste.

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 pre-cleaning, 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.

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.

3.1.8 PRE-ABATEMENT ACTIVITIES

3.1.8.1 PRE-ABATEMENT MEETING

The VA representative, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH/CIH that all materials and equipment required for the project are on the site, will arrange for a pre-abatement meeting between the Contractor, the CPIH/CIH, Competent Person(s), the VA representative(s), and the VPIH/CIH. The purpose of the meeting is to discuss any aspect of the submittals needing clarification or amplification and to discuss any aspect of the project execution and the sequence of the operation. The Contractor shall

be prepared to provide any supplemental information/documentation to the VA's representative regarding any submittals, documentation, materials or equipment. Upon satisfactory resolution of any outstanding issues, the VA's representative will issue a written order to proceed to the Contractor. No abatement work of any kind described in the following provisions shall be initiated prior to the VA written order to proceed.

3.1.8.2 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/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(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/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.

3.1.8.3 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 VA A/E Quality Alert 07/09 indicating the failure to identify asbestos in the areas listed as well as common issues when preparing specifications and contract documents. This is especially critical when demolition is planned, because AHERA surveys are non-destructive, and ACM may remain undetected. A NESHAPS (destructive) ACM inspection should be conducted on all building structures that will be demolished. Ensure the following areas are inspected on the project: lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside utility chases/walls; transite piping/ductwork/sheets;

behind radiators; lab fume hoods; transite lab countertops; roofing materials; below window sills; water/sewer lines; electrical conduit coverings; crawlspaces (previous abatement contamination); flooring/mastic covered by carpeting/new flooring; exterior insulated wall panels; on underground fuel tanks; and steam line trench coverings.

C. 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.

3.2 REMOVAL OF ACM

3.2.1 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 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: When authorized by VA, 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.

3.2.2 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 (3 meters) of the area where work is to done. Secure the secondary barrier with duct tape to prevent it from moving or debris from getting behind it. Remove the secondary barrier at the end of the shift or as work in the area is completed. Keep residue on the secondary barrier wetted. When removing, fold inward to prevent spillage and place in a disposal bag.

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.

3.2.3 WET REMOVAL OF ACM

A. Adequately and thoroughly wet the ACM to be removed prior to removal with amended water or when authorized by VA, removal encapsulant to reduce/prevent fiber release to the air. Adequate time (at a minimum two hours) must be allowed for the amended water or removal encapsulant

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 when authorized in writing by the VPIH/CIH and VA when a greater safety hazard (e.g., electricity) is present.**

B. If ACM does not wet well with amended water due to composition, 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. Boiler Breeching 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.

3.2.4 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 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 VPIH/CIH and VA Contracting Officer. 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.

3.3 LOCKDOWN ENCAPSULATION

3.3.1 GENERAL

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

3.3.2 DELIVERY AND STORAGE

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.

3.3.3 WORKER PROTECTION

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 an organic solvent based encapsulant is used. The CPIH/CIH shall be responsible for provision of adequate respiratory protection. Note: Flammable and combustible encapsulants shall not be used, unless authorized in writing by the VA.

3.3.4 ENCAPSULATION OF SCRATCH COAT PLASTER OR PIPING

A. Apply two coats of lockdown 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 lockdown 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 lockdown encapsulant and contrast the color in the second coat so that visual confirmation of completeness and uniform coverage of each coat is possible. Adhere to the manufacturer's instructions for coloring. At the completion of the encapsulation, the surface must be a uniform third color produced by the mixture.

3.3.5 SEALING EXPOSED EDGES

Seal edges of ACM exposed by removal work which is inaccessible, such as a sleeve, wall penetration, etc., with two coats of bridging encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the bridging encapsulant. Apply in accordance with 3.3.4 (B).

3.4 DISPOSAL OF ACM WASTE MATERIALS

3.4.1 GENERAL

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.

3.4.2 PROCEDURES

A. The VA must be notified at least 24 hours in advance of any waste removed from the containment.
B. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures is this specification. Waste shall be double-bagged and wetted with amended water 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.
C. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Sealed waste bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second waste bag and sealed, which then must also be wet wiped or HEPA vacuumed.
D. 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.

3.5 PROJECT DECONTAMINATION

3.5.1 GENERAL

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

3.5.2 REGULATED AREA CLEARANCE

Clearance 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.

3.5.3 WORK DESCRIPTION

Decontamination includes the clearance air testing 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.

3.5.4 PRE-DECONTAMINATION CONDITIONS

A. Before decontamination starts, all ACM waste from the regulated area shall be collected and removed, and the loose 6 mil layer of poly removed while being adequately wetted with amended water 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.

3.5.5 FIRST CLEANING

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

3.5.6 PRE-CLEARANCE INSPECTION AND TESTING

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.

3.5.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES

With the express written permission of the VA's representative, perform lockdown encapsulation of all surfaces from which asbestos was abated in accordance with the procedures in this specification. Negative pressure shall be maintained in the regulated area during the lockdown application.

3.6 FINAL VISUAL INSPECTION AND AIR CLEARANCE TESTING

3.6.1 GENERAL

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.

3.6.2 FINAL VISUAL INSPECTION

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.

3.6.3 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 clearance 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/35 cf, 5 PCM samples shall be collected for clearance and a minimum of one field blank. If work is equal to or more than 260 lf/160 sf/35 cf, AHERA TEM sampling shall be performed for clearance. TEM analysis shall be done in accordance with procedures for EPA AHERA 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.

3.6.4 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 by the AHERA PCM protocol, or 70 AHERA structures per square millimeter (s/mm^2) by AHERA TEM.

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 using calibrated pumps shall be collected for clearance samples. Before pumps are started, initiate aggressive air mixing 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. Final clearance for soil that is not encapsulated, 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 using calibrated pumps shall be collected for clearance samples. Air clearance of work areas where contaminated soil has been removed is in addition to the requirement for clearance by bulk sample analysis discussed within these specifications. There will be no aggressive air sampling for the clearance of soil due to the fact that aggressive air sampling may overload the cassettes.
   4. Random samples shall be collected from areas of soil which have been abated to ensure that the soil has been properly decontaminated. The total number of samples to be collected from the soil areas shall be; <1000 SF of soil – 3 samples; >1000 to <5000 SF of soil – 5 samples; and >5000 SF of soil – 7 samples. The soil samples shall be collected in a statistically random manner and shall be analyzed by PLM method. The clearance level to determine the soil clean is <1% asbestos by weight as analyzed by PLM method. If this level is achieved, the soil areas shall be considered clear. If the levels are >1% asbestos, the areas shall be re-cleaned until the sample results are <1%.

3.6.5 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.
C. Random samples shall be collected from areas of soil which have been abated to ensure that the soil has been properly decontaminated. The total number of samples to be collected from the soil areas shall be; <1000 SF of soil – 3 samples; >1000 to <5000 SF of soil – 5 samples; and >5000 SF of soil – 7 samples. The soil samples shall be collected in a statistically random manner and shall be analyzed by PLM method. The clearance level to determine the soil clean is <1% asbestos by weight as analyzed by PLM method. If this level is achieved, the soil

areas shall be considered clear. If the levels are >1% asbestos, the areas shall be re-cleaned until the sample results are <1%.

3.6.6 CLEARANCE SAMPLING USING TEM – EQUAL TO OR MORE THAN 260LF/160SF: TEM

A. Clearance requires 13 samples be collected; 5 inside the regulated area; 5 outside the regulated area; and 3 field blanks.
B. The TEM method will be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 13 clearance samples shall be collected. All samples must be equal to or less than 70 AHERA structures per square millimeter (s/mm^2) AHERA TEM.

3.6.7 LABORATORY TESTING OF PCM CLEARANCE SAMPLES

The services of an AIHA accredited laboratory will be employed by the VA to perform analysis for the PCM air samples. The accredited laboratory shall be successfully participating in the AIHA Proficiency Analytical Testing (PAT) program. 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.

3.6.8 LABORATORY TESTING OF TEM SAMPLES

Samples shall be sent by the VPIH/CIH to a NIST accredited laboratory for analysis by TEM. The laboratory shall be successfully participating in the NIST Airborne Asbestos Analysis (TEM) program. 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.

3.6.9 LABORATORY TESTING OF BULK SAMPLES

Samples shall be sent by the VPIH/CIH or CPIH/CIH to a NIST accredited laboratory for analysis by PLM. The laboratory shall be successfully participating in the NIST Bulk Asbestos Analysis (PLM) program. 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.

3.7 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.7.1 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.

3.7.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

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

3.7.3 WORK SHIFTS

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

ATTACHMENT #1

CERTIFICATE OF COMPLETION

DATE: _____ VA Project #: _____

_____

PROJECT NAME:_____Abatement Contractor:_____

VAMC/ADDRESS:_____

1. I certify that I have personally inspected, monitored and supervised the abatement work of (specify regulated area or Building):

   which took place from / / to / /

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

CPIH/CIH Signature/Date:.....

CPIH/CIH Print Name:.....

Abatement Contractor Signature/Date:.....

Abatement Contractor Print Name:.....

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 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 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 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 pipe insulation joints and asbestos contaminated elements in an appropriate regulated area in the following approximate quantities:
50 each fittings 50 - 150 mm (2" - 6") in diameter

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 AND STEAM GENERATION
F. Section 23 07 11, HVAC INSULATION.
G. Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING / Section 22 11 00, FACILITY WATER DISTRIBUTION / Section 22 13 00, FACILITY SANITARY AND VENT PIPING / Section 22 14 00, FACILITY STORM DRAINAGE
H. Section 23 21 13, HYDRONIC PIPING / Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING.
I. Section 23 31 00, HVAC DUCTS AND CASINGS / Section 23 37 00, AIR OUTLETS AND INLETS.

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 Asbestos Hazard Abatement Plans 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.

1.1.5 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 Procedures. VA Design and Construction Procedures 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 VARIATIONS IN QUANTITY

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 and accessibility to ACM. 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 ACM and those prices shall be used for additional work required under the contractor.

1.3 STOP ASBESTOS REMOVAL

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 it is 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 practical. The Contractor shall immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

A. Airborne PCM analysis results equal to or greater than 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area;
B. breach or break in regulated area containment barrier(s);
C. less than –0.02" WCG pressure in the regulated area;
D. serious injury/death at the site;
E. fire/safety emergency at the site;
F. respiratory protection system failure;
G. power failure or loss of wetting agent; or
H. any visible emissions observed outside the regulated area.

1.4 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. 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 EPA).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 and 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 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.

Personal sampling/monitoring - Representative air samples obtained in the breathing zone for one or more workers within the regulated area using a filter cassette and a calibrated air sampling 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 eight (8) hour time weighted average PEL is 0.1 fibers per cubic centimeter (0.1 f/cc) of air and the 30-minute Excursion Limit is 1.0 fibers per cubic centimeter (1 f/cc).

Pipe tunnel – An area, typically located adjacent to mechanical spaces or boiler rooms in which the pipes servicing the heating system in the building are routed to allow the pipes to access heating elements.

These areas may contain asbestos pipe insulation, asbestos fittings, or asbestos-contaminated soil.

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

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

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

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

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

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

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

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

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

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

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

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

Renovation - Altering a facility or one or more facility components in any way, including the stripping or removal of asbestos from a facility component which does not involve demolition activity.
Repair - Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.
Shower room - The portion of the PDF where personnel shower before leaving the regulated area.
Supplied air respirator (SAR) - A respiratory protection system that supplies minimum Grade D respirable air per ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.
Surfacing ACM - A material containing more than 1 percent asbestos that is sprayed, troweled on or otherwise applied to surfaces for acoustical, fireproofing and other purposes.
Surfactant - A chemical added to water to decrease water's surface tension thus making it more penetrating into ACM.
Thermal system ACM - A material containing more than 1 percent asbestos applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain.
Transmission electron microscopy (TEM) - A microscopy method that can identify and count asbestos fibers.
VA Professional Industrial Hygienist (VPIH/CIH) – The Department of Veterans Affairs Professional Industrial Hygienist must meet the qualifications of a PIH, and may be a Certified Industrial Hygienist (CIH).
VA Representative - The VA official responsible for on-going project work.
Visible emissions - Any emissions, which are visually detectable without the aid of instruments, coming from ACM/PACM/RACM/ACS or ACM waste material.
Waste/Equipment decontamination facility (W/EDF) – The area in which equipment is decontaminated before removal from the regulated area.
Waste generator - Any owner or operator whose act or process produces asbestos-containing waste material.
Waste shipment record - The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.
Wet cleaning - The process of thoroughly eliminating, by wet methods, any asbestos contamination from surfaces or objects.

1.4.3 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

I. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000

K. NEC National Electrical Code (by NFPA)

L. NEMA National Electrical Manufacturer's Association
2101 L Street, NW
Washington, DC 20037

M. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555

N. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236

O. OSHA Occupational Safety and Health Administration
U.S. Department of Labor

Government Printing Office
Washington, DC 20402

P. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800

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

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.

1.5.3 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 Subpart I - Personal Protective Equipment
3. Title 29 CFR 1910.134 - Respiratory Protection
4. Title 29 CFR 1926 - Construction Industry Standards
5. Title 29 CFR 1910.1020 - Access to Employee Exposure and Medical Records
6. Title 29 CFR 1910.1200 - Hazard Communication

7. Title 29 CFR 1910 Subpart K - 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:

ASBESTOS ABATEMENT CONTRACTOR LICENSING AND TRAINING, OHIO ADMINISTRATIVE CODE, RULES 3701-34-01 THROUGH 3701-34-7

1.5.5 LOCAL REQUIREMENTS

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

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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 and ANSI 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:

Send written notification as required by USEPA National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Asbestos regulations (40 CFR 61, Subpart M) to the regional Asbestos NESHAPS Contact at least 10 days prior to beginning any work on asbestos abatement or related work. Send notification to the following address:

Department of Public Health
Division of Air Quality
1925 St. Clair Avenue
Cleveland, Ohio 44114-2080

Send written notification as required by Ohio Department of Health at least 10 days prior to beginning any work on any planned asbestos hazard abatement project as required by chapter 3701-34. Send notification to the following address:

Ohio Department of Health
P.O. Box 15278
Columbus, Ohio 43215

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, and Local regulations.

B. Contractor shall maintain a current Ohio Department of Health “Asbestos Abatement Contractor” license in accordance with paragraph (C) of rule 3701-34-01 of the Administrative Code

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, 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.

1.5.12 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 Asbestos Hazard Abatement Plans 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 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 State of Ohio Department of Health Certifications.
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. A copy of the Contractor's Asbestos Hazard Abatement Plan (AHAP) 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; and
   5. Personal protective equipment to be used.
H. At this meeting the Contractor shall provide all submittals as required.
I. Procedures for handling, packaging and disposal of asbestos waste.
J. Emergency Action Plan and Contingency Plan Procedures.

1.6 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; 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 Asbestos Hazard Abatement Plans (AHAPs) for asbestos work; and 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 Asbestos Hazard Abatement Plan 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 Asbestos Hazard Abatement Plans 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.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

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

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

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

1.7.3 SELECTION AND USE OF RESPIRATORS

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

1.7.4 MINIMUM RESPIRATORY PROTECTION

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

1.7.5 MEDICAL WRITTEN OPINION

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

1.7.6 RESPIRATOR FIT TEST

All personnel wearing respirators shall have a current 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

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.

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1.7.8 MAINTENANCE AND CARE OF RESPIRATORS

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

1.8 WORKER PROTECTION

1.8.1 TRAINING OF ABATEMENT PERSONNEL

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

1.8.2 MEDICAL EXAMINATIONS

Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. A current physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the medical opinion the person has been evaluated for working in a heat and cold stress environment while wearing personal protective equipment (PPE) and is able to perform the work without risk of material health impairment.

1.8.3 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.

1.8.4 REGULATED AREA ENTRY PROCEDURE

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

1.8.5 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.

1.8.6 REGULATED AREA REQUIREMENTS

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

Provide each regulated area with separate personnel decontamination facilities (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF are the only means of ingress and egress to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the W/EDF.

1.9.2 GENERAL REQUIREMENTS

All personnel entering or exiting a regulated area must go through the PDF and shall follow the requirements at 29 CFR 1926.1101 (j)(1) and these specifications. All waste, equipment and contaminated materials must exit the regulated area through the W/EDF and be decontaminated in accordance with these specifications. Walls and ceilings of the PDF and

W/EDF must be constructed of a minimum of 3 layers of 6 mil opaque fire retardant polyethylene sheeting and be securely attached to existing building components and/or an adequate temporary framework. A minimum of 3 layers of 6 mil poly shall also be used to cover the floor under the PDF and W/EDF units. Construct doors so that they overlap and secure to adjacent surfaces. Weight inner doorway sheets with layers of duct tape so that they close quickly after release. Put arrows on sheets so they show direction of travel and overlap. If the building adjacent area is occupied, construct a solid barrier on the occupied side(s) to protect the sheeting and reduce potential for non-authorized personnel entering the regulated area.

1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF

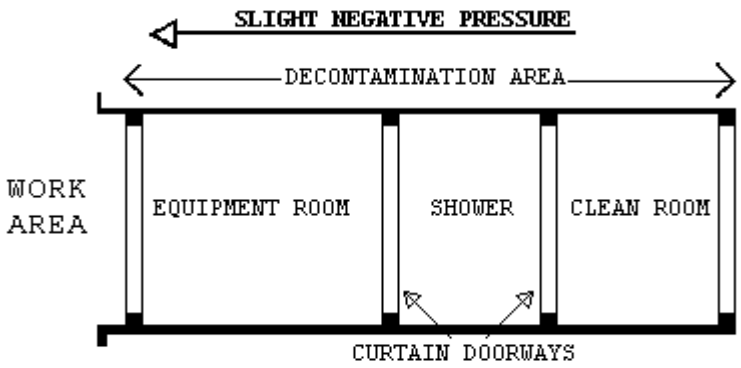
The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention must be provided at the point of connection to the VA system. Water supply must be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary overhead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

1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)

The Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room. 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.

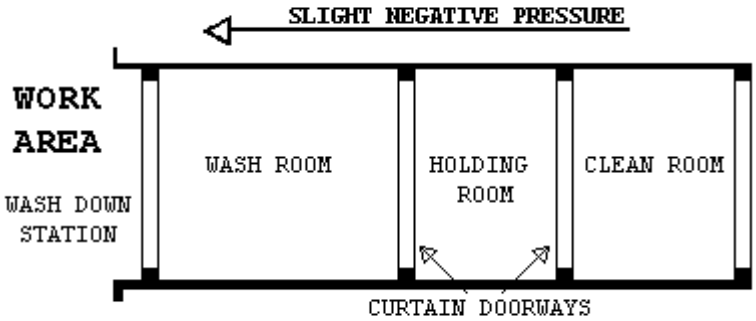
2. Shower Room: The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall 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 once per day 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 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 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 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES

At the washdown station in the regulated area, thoroughly wet wipe/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/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-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.
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).

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

2.2.1 GENERAL

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 2.2.8; 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. 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/CIH 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/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/CIH

The Contractor’s CPIH/CIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH/CIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor’s personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in sampling and analysis. The IH Technician shall have

successfully completed a NIOSH 582 Course or equivalent and provide documentation. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA AHERA/State Contractor/Supervisor (or Abatement Worker) and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation on substantially similar projects in size and scope. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT and approved by the VA prior to start of the project. A daily log shall be maintained by the CPIH/CIH or IH Technician, documenting all OSHA requirements for air personal monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH upon request. The log will contain, at a minimum, information on personnel or area samples, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH/CIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH/CIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH/CIH responsibilities. Additionally, the CPIH/CIH will monitor and record pressure readings within the containment daily with a minimum of two readings at the beginning and at the end of a shift, and submit the data in the daily report.

2.4 ASBESTOS HAZARD ABATEMENT PLAN

The Contractor shall have established Asbestos Hazard Abatement Plan (AHAP) in printed form and loose leaf folder consisting of simplified text, diagrams, sketches, and pictures that establish and explain clearly the ways and 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 the project. The AHAP 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 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 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-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 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; and 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; and 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/IH's familiar with your air monitoring and Asbestos Hazard Abatement Plans; 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/TWAs/ELs. 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. Removal of any poly barriers.
   2. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
   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/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.

2.6 ENCAPSULANTS

2.6.1 TYPES OF ENCAPSULANTS

A. The following four types of encapsulants must comply with 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/ft^2).
   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/ft^2) (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

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

If recyclable clothing is provided, all requirements of EPA, DOT and OSHA shall be met.

PART 3 – EXECUTION

3.1 REGULATED AREA PREPARATIONS

3.1.1 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 <u>not</u> 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.

3.1.2 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.

3.1.3.1 SHUT DOWN - LOCK OUT ELECTRICAL

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 requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.

3.1.3.2 SHUT DOWN - LOCK OUT HVAC

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 poly disposal bags for disposal as asbestos waste.

3.1.4 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA

3.1.4.1 GENERAL

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.

3.1.4.2 PREPARATION PRIOR TO SEALING OFF

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

3.1.4.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

3.1.4.4 CRITICAL BARRIERS

The regulated area must be completely separated from the adjacent area(s) 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.

3.1.4.5 EXTENSION OF THE REGULATED AREA

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

3.1.4.6 FLOOR BARRIERS:

All floors within 10’ of glovebag work shall be covered with 2 layers of 6 mil fire retardant poly.

3.1.5 SANITARY FACILITIES

The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

3.1.6 PRE-CLEANING

3.1.6.1 PRE-CLEANING MOVABLE OBJECTS

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.

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area. PPE must be donned by all workers performing pre-cleaning activities. After items have been pre-cleaned and decontaminated, they may be removed from the work area for storage until the completion of abatement in the work area.

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.

3.1.6.2 PRE-CLEANING FIXED OBJECTS

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area.

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 pre-cleaning, 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.

3.1.6.3 PRE-CLEANING SURFACES IN THE REGULATED AREA

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area.

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.

3.1.7 PRE-ABATEMENT ACTIVITIES

3.1.7.1 PRE-ABATEMENT MEETING

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

3.1.7.2 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 AEQA 10-95 indicating the failure to identify asbestos in the areas listed as well as common issues when preparing specifications and contract documents. This is especially critical when demolition is planned, because AHERA surveys are non-destructive, and ACM may remain undetected. A NESHAPS (destructive) ACM inspection should be conducted on all building structures that will be demolished. Ensure the following areas are inspected on the project: Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside utility chases/walls; transite piping/ductwork/sheets; behind radiators; lab fume hoods; transite lab countertops; 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; and steam line trench coverings.
C. 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.

3.1.7.3 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/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(s), especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation.
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.

3.2 REMOVAL OF PIPING ACM

3.2.1 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.

3.2.2 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 (3 meters) of the area where work is to done. Secure the secondary barrier with duct tape to prevent it from moving or debris from getting behind it. Remove the secondary barrier at the end of the shift or as work in the area is completed. Keep residue on the secondary barrier wetted. When removing, fold inward to prevent spillage and place in a disposal bag.
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.

3.2.3 WET REMOVAL OF ACM

A. Using acceptable glovebag procedures, adequately and thoroughly wet the ACM to be removed prior to removal with amended water or when authorized by VA, removal encapsulant to reduce/prevent fiber release to the air. Adequate time (at a minimum two hours) must be allowed for the amended water or removal encapsulant 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 when authorized in writing by the VPIH/CIH and VA when a greater safety hazard (e.g., electricity) is present**

3.3 GLOVEBAG REMOVAL PROCEDURES

3.3.1 GENERAL

All applicable OSHA requirements and glovebag manufacturer’s recommendations shall be met during glove bagging operations. In cases where live steam lines are present, the lines must be shut down prior to any work being performed on the system. **No abatement work shall be conducted on live, pressurized steam lines.** The Contractor may choose to use a High Temperature Glovebag in which a temperature rating ranges from 300˚F to 700˚F on steam lines that have recently been shut down and remain at high temperature for some time. In the case where a glovebag is not feasible, the Contractor will need to build a full negative pressure containment of sufficient size and follow all regulations as it pertains to removal.

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 wire cutters 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.

3.3.2 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.

3.4 LOCKDOWN ENCAPSULATION

3.4.1 GENERAL

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.

3.4.2 SEALING EXPOSED EDGES

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.

3.5 DISPOSAL OF ACM WASTE MATERIALS

3.5.1 GENERAL

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. The VA must be notified at least 24 hours in advance of any waste removed from the containment
B. 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 and wetted with amended water 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'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.
C. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Sealed waste bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second waste bag and sealed, which then must also be wet wiped or HEPA vacuumed..
D. 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.

3.6 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.
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.

3.6.2 REGULATED AREA CLEARANCE

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.

3.6.3 WORK DESCRIPTION

Decontamination includes the clearance air testing 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.

3.6.4 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.

3.6.5 FIRST CLEANING

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

3.6.6 PRE-CLEARANCE INSPECTION AND TESTING

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**.6.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES**

With the express written permission of the VA's representative, perform lockdown encapsulation of all surfaces from which asbestos was abated in accordance with the procedures in this specification.

3.7 FINAL VISUAL INSPECTIONS AND AIR CLEARANCE TESTING

3.7.1 GENERAL

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.

3.7.2 FINAL VISUAL INSPECTION

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.

3.7.3 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 clearance 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/35 cf, 5 PCM samples shall be collected for clearance and a minimum of one field blank. If work is equal to or more than 260 lf/160 sf/35 cf, AHERA TEM sampling shall be performed for clearance. TEM analysis shall be done in accordance with procedures for EPA AHERA 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.

3.7.4 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 by the AHERA PCM protocol, or 70 AHERA structures per square millimeter (s/mm^2) by AHERA TEM.
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 using calibrated pumps shall be collected for clearance samples. Before pumps are started, initiate aggressive air mixing 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.

3.7.5 CLEARANCE SAMPLING USING PCM

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.

3.7.6 CLEARANCE SAMPLING USING TEM

A. Clearance requires 13 samples be collected; 5 inside the regulated area; 5 outside the regulated area; and 3 field blanks.
B. The TEM method will be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 13 clearance samples shall be collected. All samples must be equal to or less than 70 AHERA structures per square millimeter (s/mm^2) AHERA TEM.

3.7.7 LABORATORY TESTING OF PCM SAMPLES

The services of an AIHA accredited laboratory will be employed by the VA to perform analysis for the PCM air samples. The accredited laboratory shall be successfully participating in the AIHA Proficiency Analytical Testing (PAT) program. 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.

3.7.8 LABORATORY TESTING OF TEM SAMPLES

Samples shall be sent by the VPIH/CIH to a NIST accredited laboratory for analysis by TEM. The laboratory shall be successfully participating in the NIST Airborne Asbestos Analysis (TEM) program. 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

3.8 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, materials, and debris from the project area.
B. Package and dispose of all asbestos waste as required. 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.
C. Repair or replace all interior finishes damaged during the abatement work.
D. The VA will be notified of any waste removed from the containment prior to 24 hours.

E. Fulfill other project closeout requirements as specified elsewhere in this specification.

3.8.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

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

3.8.3 WORK SHIFTS

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

3.8.4 RE-INSULATION

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

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 glovebag 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 82 13.19
ASBESTOS FLOOR TILE AND MASTIC 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 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 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:
   500 sq ft of asbestos-containing mastic below non-asbestos-containing flooring including the removal of all non-asbestos-containing materials required to expose and remove asbestos-containing mastic.

1.1.3 RELATED WORK

A. Section 07 84 00, FIRESTOPPING.
B. Section 02 41 00, DEMOLITION.
C. Division 09, FINISHES.

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, regulated area preparations, emergency procedures arrangements, and Asbestos Hazard Abatement Plans for asbestos abatement work.
B. Abatement activities including removal, encapsulation, 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.

1.1.5 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 Construction Procedure. VA Design 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. The following limitations of use shall apply to existing facilities shown on drawings:

1.2 VARIATIONS IN QUANTITY

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 and accessibility to ACM. 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 ACM and those prices shall be used for additional work required under the contractor.

1.3 STOP ASBESTOS REMOVAL

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 it is 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 practical. The Contractor shall immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

A. Airborne PCM analysis results equal to or greater than 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area;
B. breach or break in regulated area containment barrier(s);
C. less than –0.02" WCG pressure in the regulated area;
D. serious injury/death at the site;
E. fire/safety emergency at the site;
F. respiratory protection system failure;
G. power failure or loss of wetting agent; or
H. any visible emissions observed outside the regulated area.

1.4 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. 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 PELs.

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 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.

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.

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

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

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

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

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

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

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

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

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

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

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

Regulated area - An area established by the employer to demarcate where Class I, II, and 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.

1.4.3 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

I. NEC National Electrical Code (by NFPA)

J. NEMA National Electrical Manufacturer's Association
2101 L Street, NW
Washington, DC 20037

K. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555

L. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236

M. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402

N. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800

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 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.

1.5.2 CONTRACTOR RESPONSIBILITY

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

1.5.3 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:

ASBESTOS ABATEMENT CONTRACTOR LICENSING AND TRAINING, OHIO ADMINISTRATIVE CODE, RULES 3701-34-01 THROUGH 3701-34-7

1.5.5 LOCAL REQUIREMENTS

If 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:

Send written notification as required by USEPA National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Asbestos regulations (40 CFR 61, Subpart M) to the regional Asbestos NESHAPS Contact at least 10 days prior to beginning any work on asbestos abatement or related work. Send notification to the following address:

Department of Public Health

Division of Air Quality
1925 St. Clair Avenue
Cleveland, Ohio 44114-2080

Send written notification as required by Ohio Department of Health at least 10 days prior to beginning any work on any planned asbestos hazard abatement project as required by chapter 3701-34. Send notification to the following address:

Ohio Department of Health
P.O. Box 15278
Columbus, Ohio 43215

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, and Local regulations.

B. Contractor shall maintain a current Ohio Department of Health “Asbestos Abatement Contractor” license in accordance with paragraph (C) of rule 3701-34-01 of the Administrative Code

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 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, equipments 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.

1.5.12 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 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.

1.5.13 EMERGENCY ACTION PLAN AND ARRANGEMENTS

A. An Emergency Action Plan shall be developed prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 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 Asbestos Hazard Abatement Plans 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 State of Ohio Department of Health Certifications.
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 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;
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(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 Asbestos Hazard Abatement Plans for asbestos work; and 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 Asbestos Hazard Abatement Plan 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 Asbestos Hazard Abatement Plans 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; and 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.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

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

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

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

1.7.3 SELECTION AND USE OF RESPIRATORS

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

1.7.4 MINIMUM RESPIRATORY PROTECTION

Minimum respiratory protection shall be a 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.

1.7.5 MEDICAL WRITTEN OPINION

No employee shall be allowed to wear a respirator unless a physician or other licensed health care professional has provided a written

determination they are medically qualified to wear the class of respirator to be used on the project while wearing whole body impermeable garments and subjected to heat or cold stress.

1.7.6 RESPIRATOR FIT TEST

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

1.7.7 RESPIRATOR FIT CHECK

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

1.7.8 MAINTENANCE AND CARE OF RESPIRATORS

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

1.7.9 SUPPLIED AIR SYSTEMS

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

1.8 WORKER PROTECTION

1.8.1 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.

1.8.2 MEDICAL EXAMINATIONS

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

for working in a heat and cold stress environment while wearing personal protective equipment (PPE) and is able to perform the work without risk of material health impairment.

1.8.3 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. Worker protection shall meet the most stringent requirements.

1.8.4 REGULATED AREA ENTRY PROCEDURE

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

1.8.5 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.

1.8.6 REGULATED AREA REQUIREMENTS

The Competent Person shall meet all requirements of 29 CFR 1926.1101 (o) and assure that all requirements for Class I 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.

1.9 DECONTAMINATION FACILITIES:

1.9.1 DESCRIPTION:

Provide each regulated area with separate personnel decontamination facilities (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF are the only means of ingress and egress to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the W/EDF.

1.9.2 GENERAL REQUIREMENTS

All personnel entering or exiting a regulated area must go through the PDF and shall follow the requirements at 29 CFR 1926.1101 (j)(1) and these specifications. All waste, equipment and contaminated materials must exit the regulated area through the W/EDF and be decontaminated in

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

1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF

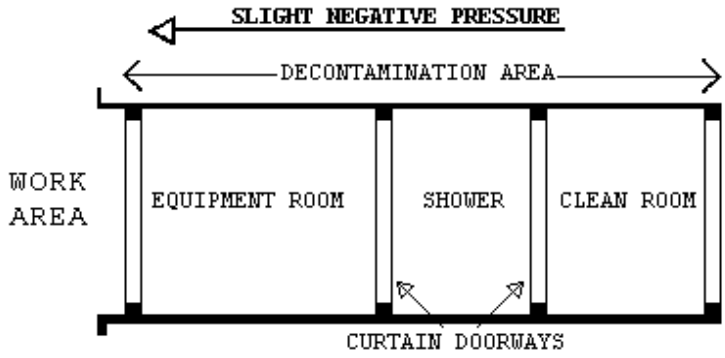
The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention must be provided at the point of connection to the VA system. Water supply must be of adequate pressure and meet requirements of 29 CFR 1910.141 (d)(3). Provide adequate temporary overhead 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)

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.

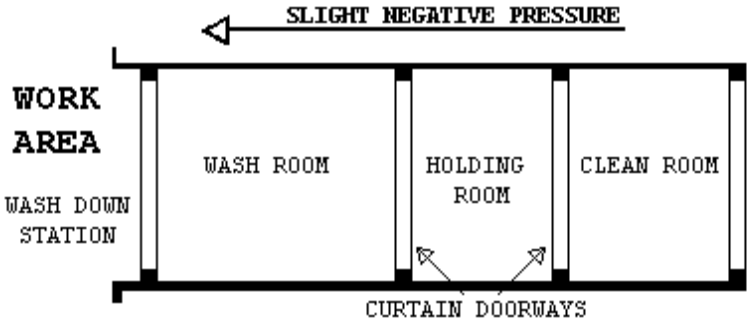


1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)

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 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:

At the 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/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-mils. For floors and all other uses, sheeting of at least 6-mil shall be used in widths selected to minimize the frequency of joints. Fire retardant poly shall be used throughout.
F. The method of attaching polyethylene sheeting shall be agreed upon in advance by the Contractor and the VA and selected to minimize damage to equipment and surfaces. Method of attachment may include any combination of moisture resistant duct tape furring strips, spray glue, staples, nails, screws, lumber and plywood for enclosures or other effective procedures capable of sealing polyethylene to dissimilar finished or unfinished surfaces under both wet and dry conditions.
G. Polyethylene sheeting utilized for the PDF shall be opaque white or black in color, 6 mil fire retardant poly.
H. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and waste water filtration system shall be provided by the Contractor.
I. An adequate number of HEPA vacuums, scrapers, sprayers, nylon brushes, brooms, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements, fall protection devices, water hose to reach all areas in the regulated area, airless spray equipment, and any other tools, materials or equipment required to conduct the abatement project. All

electrically operated hand tools, equipment, electric cords shall be connected to GFCI protection.

J. Special protection for objects in the regulated area shall be detailed (e.g., plywood over carpeting or hardwood floors to prevent damage from scaffolds, water and falling material).

K. Disposal bags – 2 layers of 6 mil poly for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.

L. The VA shall be provided an advance copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication in the pre-project submittal. Chlorinated compounds shall not be used with any spray adhesive, mastic remover or other product. Appropriate encapsulant(s) shall be provided.

M. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted in the Clean Room.

N. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued must be based on a written hazard assessment conducted under 29 CFR 1910.132(d).

2.1.2 NEGATIVE PRESSURE FILTRATION SYSTEM

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

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

2.1.3 DESIGN AND LAYOUT

A. Before start of work submit the design and layout of the regulated area and the negative air machines. The submittal shall indicate the number of, location of and size of negative air machines. The point(s) of exhaust, air flow within the regulated area, anticipated negative pressure differential, and supporting calculations for sizing shall be provided. In addition, submit the following:
   1. Method of supplying power to the units and designation/location of the panels.
   2. Description of testing method(s) for correct air volume and pressure differential.
   3. If auxiliary power supply is to be provided for the negative air machines, provide a schematic diagram of the power supply and manufacturer's data on the generator and switch.

2.1.4 NEGATIVE AIR MACHINES (HEPA UNITS)

A. Negative Air Machine Cabinet: The cabinet shall be constructed of steel or other durable material capable of withstanding potential damage from rough handling and transportation. The width of the cabinet shall be less than 30" in order to fit in standard doorways. The cabinet must be factory sealed to prevent asbestos fibers from being released during use, transport, or maintenance. Any access to and replacement of filters shall be from the inlet end. The unit must be on casters or wheels.

B. Negative Air Machine Fan: The rating capacity of the fan must indicate the CFM under actual operating conditions. Manufacturer's typically use "free-air" (no resistance) conditions when rating fans. The fan must be a centrifugal type fan.

C. Negative Air Machine Final Filter: The final filter shall be a HEPA filter. The filter media must be completely sealed on all edges within a structurally rigid frame. The filter shall align with a continuous flexible gasket material in the negative air machine housing to form an air tight seal. Each HEPA filter shall be certified by the manufacturer to have an efficiency of not less than 99.97%. Testing shall have been done in accordance with Military Standard MIL-STD-282 and Army Instruction Manual 136-300-175A. Each filter must bear a UL586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.

D. Negative Air Machine Pre-filters: The pre-filters, which protect the final HEPA filter by removing larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. A first stage pre-filter shall be a low efficiency type for particles 10 micron or larger. A second stage pre-filter shall have a medium efficiency effective for particles down to 5 micron 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.

E. Negative Air Machine Instrumentation: Each unit must be equipped with a gauge to measure the pressure drop across the filters and to indicate when filters have become loaded and need to be changed. A table indicating the cfm for various pressure readings on the gauge shall be affixed near the gauge for reference or the reading shall indicate at what point the filters shall be changed, noting cfm delivery. The unit must have an elapsed time meter to show total hours of operation.

F. Negative Air Machine Safety and Warning Devices: An electrical/ mechanical lockout must be provided to prevent the fan from being operated without a HEPA filter. Units must be equipped with an automatic shutdown device to stop the fan in the event of a rupture in the HEPA filter or blockage in the discharge of the fan. Warning lights are required to indicate normal operation; too high a pressure drop across filters; or too low of a pressure drop across filters.

G. Negative Air Machine Electrical: All electrical components shall be approved by the National Electrical Manufacturer's Association (NEMA) and Underwriters Laboratories (UL). Each unit must be provided with overload protection and the motor, fan, fan housing, and cabinet must be grounded.

H. It is essential that replacement HEPA filters be tested using an “in-line” testing method, to ensure the seal around the periphery was not damaged during replacement. Damage to the outer HEPA filter seal could allow contaminated air to bypass the HEPA filter and be discharged to an inappropriate location. Contractor will provide written documentation of test results for negative air machine units with HEPA filters changed by the contractor or documentation when changed and tested by the contractor filters.

2.1.5 PRESSURE DIFFERENTIAL

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

2.2 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 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 3.1.4.8; FIRESTOPPING.
B. Place all tools, scaffolding, materials and equipment needed for working in the regulated area prior to erecting any plastic sheeting. All uncontaminated removable furniture, equipment and/or supplies shall be removed by the VA from the regulated area before commencing work. Any objects remaining in the regulated area shall be completely covered with 2 layers of 6-mil fire retardant poly sheeting and secured with duct tape. Lock out and tag out any HVAC/electrical systems in the regulated area.

2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

2.2.4 CRITICAL BARRIERS

Completely separate any operations in the regulated area from adjacent areas using 2 layers of 6 mil fire retardant poly and duct tape. Individually seal with 2 layers of 6 mil poly and duct tape all HVAC openings into the regulated area. Individually seal all lighting

fixtures, clocks, doors, windows, convectors, speakers, or any other objects/openings in the regulated area. Heat must be shut off any objects covered with poly.

2.2.5 SECONDARY BARRIERS:

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

2.2.6 EXTENSION OF THE REGULATED AREA

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

2.2.7 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/CIH 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/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/CIH

The Contractor’s CPIH/CIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH/CIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor’s personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in sampling and analysis. The IH Technician shall have successfully completed a NIOSH 582 Course or equivalent and provide documentation. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA AHERA/State Contractor/Supervisor (or Abatement Worker) and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation on substantially similar projects in size and scope. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT and approved by the VA prior to start of the project. A daily log shall be maintained by the CPIH/CIH or IH Technician, documenting all OSHA requirements for air personal monitoring for asbestos in 29 CFR 1926.1101 (f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH upon request. The log will contain, at a minimum, information on personnel or area samples, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH/CIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH/CIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH/CIH responsibilities. Additionally, the CPIH/CIH will monitor and record pressure readings

within the containment daily with a minimum of two readings at the beginning and at the end of a shift, and submit the data in the daily report.

2.4 ASBESTOS HAZARD ABATEMENT PLAN

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

A. Minimum Personnel Qualifications
B. 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 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, 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; and 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 the AHAP 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/IH's familiar with your air monitoring and Asbestos Hazard Abatement Plans; 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/TWAs/ELs. 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. Removal of any poly barriers.
2. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
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/CIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. It will also include information on the containment and transportation of waste from the containment with applicable Chain of Custody forms. The report shall include a certificate of completion, signed and dated by the CPIH/CIH, in accordance with Attachment #1. All

clearance and perimeter area samples must be submitted. The VA Representative will retain the abatement report after completion of the project and provide copies of the abatement report to VAMC Office of Engineer and the Safety Office.

PART 3 - EXECUTION

3.1 PRE-ABATEMENT ACTIVITIES

3.1.1 PRE-ABATEMENT MEETING

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

3.1.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS

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 AEQA 10-95 indicating the failure to identify asbestos in the areas listed as well as common issues when preparing specifications and contract documents. This is especially critical when demolition is planned, because AHERA surveys are non-destructive, and ACM may remain undetected. A NESHAPS (destructive) ACM inspection should be conducted on all building structures that will be demolished. Ensure the following areas are inspected on the project: Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside utility chases/walls; transite piping/ductwork/sheets; behind radiators; lab fume hoods; transite lab countertops; 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; and steam line trench coverings.

C. 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. If ACM floor tile is attached to the carpet while

the Contractor is removing the carpet that section of the carpet will be disposed of as asbestos waste.

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/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.

3.2 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 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.

3.2.2 CONTROLLING ACCESS TO THE REGULATED AREA

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

3.2.3 SHUT DOWN - LOCK OUT ELECTRICAL

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 requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.

3.2.4 SHUT DOWN - LOCK OUT HVAC

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 poly disposal bags for disposal as asbestos waste.

3.2.5 SANITARY FACILITIES

The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

3.2.6 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.

3.2.7 PREPARATION PRIOR TO SEALING OFF

Place all tools, 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.

3.2.8 CRITICAL BARRIERS

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

3.2.9 FLOOR BARRIERS

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

3.2.10 PRE-CLEANING MOVABLE OBJECTS

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area. After items have been pre-cleaned and decontaminated, they may be removed from the work area for storage until the completion of abatement in the work area.

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.

3.2.11 PRE-CLEANING FIXED OBJECTS

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area

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 pre-cleaning, 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.

3.2.12 PRE-CLEANING SURFACES IN THE REGULATED AREA

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area

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.

3.2.13 EXTENSION OF THE REGULATED AREA

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

3.3 REMOVAL OF CLASS II FLOORING, ROOFING, AND TRANSITE MATERIALS:

3.3.1 GENERAL

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.

3.3.2 REMOVAL OF FLOORING MATERIALS:

A. All requirements of OSHA Flooring agreement provisions shall be followed:
   1. The Contractor shall provide enough HEPA negative air machines to effect > - 0.02” WCG pressure. Provide a standby unit in the event of machine failure and/or emergency in an adjacent area. The contractor shall use 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. Flooring shall be removed intact, as much as possible. Do not rip or tear flooring.
   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.**3**.3 REMOVAL OF MASTIC

A. All chemical mastic removers must be low in volatile organic compound (VOC) content, have a flash point greater than 200° Fahrenheit, contain no chlorinated solvents, and comply with California Air Resources Board (CARB) thresholds for VOCs (effective January 1, 2010).
B. A negative air machine as required under flooring removal shall be provided.
C. Follow all manufacturers’ instructions in the use of the mastic removal material.
D. Package all waste in 6 mil poly lined fiberboard drums.
E. Prior to application of any liquid material, check the floor for penetrations and seal before removing mastic.

3.4 DISPOSAL OF CLASS II WASTE MATERIAL:

3.4.1 GENERAL

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 PROJECT DECONTAMINATION

3.5.1 GENERAL

A. The VA must be notified at least 24 hours in advance of any waste removed from the containment,
B. The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH/CIH.
C. 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.

D. 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.

3.5.2 REGULATED AREA CLEARANCE

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.

3.5.3 WORK DESCRIPTION

Decontamination includes the clearance air testing 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.

3.5.4 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.

3.5.5 CLEANING:

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

3.6 VISUAL INSPECTION AND AIR CLEARANCE TESTING

3.6.1 GENERAL

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.

3.6.2 VISUAL INSPECTION

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.

3.6.3 AIR CLEARANCE TESTING

A. After an acceptable final visual inspection by the VPIH/CIH and VA Representative, the VPIH/CIH will perform the final clearance 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/35 cf, 5 PCM samples shall be collected for clearance and a minimum of one field blank. If work is equal to or more than 260 lf/160 sf/35 cf, AHERA TEM sampling shall be performed for clearance. TEM analysis shall be done in accordance with procedures for EPA AHERA 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.

3.6.4 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 by the AHERA PCM protocol, or 70 AHERA structures per square millimeter (s/mm^2) by AHERA TEM.
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 using calibrated pumps shall be collected for clearance samples. Before pumps are started, initiate aggressive air mixing 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.

3.7 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.7.1 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.

3.7.2 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.

3.7.3 WORK SHIFTS

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

ATTACHMENT #1

CERTIFICATE OF COMPLETION

DATE: _____ VA Project #: _____

PROJECT NAME:_____Abatement Contractor:_____

VAMC/ADDRESS:_____

1. I certify that I have personally inspected, monitored and supervised the abatement work of (specify regulated area or Building):

   which took place from / / to / /

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

CPIH/CIH Signature/Date:_____

CPIH/CIH Print Name:_____

Abatement Contractor Signature/Date:_____

Abatement Contractor Print Name: _____

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 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural steel shapes, plates, and bars.
   2. Bolts, nuts, and washers.

1.2 RELATED REQUIREMENTS

A. Materials Testing And Inspection During Construction: Section 01 45 29, TESTING LABORATORY SERVICES.
B. Steel Decking: Section 05 31 00, STEEL DECKING.
C. Fireproofing: Section 07 81 00, APPLIED FIREPROOFING.
D. Painting: Section 09 91 00, PAINTING.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.
B. American Institute of Steel Construction (AISC):
   1. AISC Manual - Steel Construction Manual, 14th Ed.
   2. 303-10 - Code of Structural Steel Buildings and Bridges.
   3. 360-10: Specification for Structural Steel Buildings.
C. The American Society of Mechanical Engineers (ASME):
   1. B18.22.1-09 - Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers.
D. American Welding Society (AWS):
   1. D1.1/D1.1M-15 - Structural Welding Code - Steel.
E. ASTM International (ASTM):
   1. A6/A6M-14 - General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
   2. A36/A36M-14 - Carbon Structural Steel.
   3. A325-14 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
   4. A500/A500M-13 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing and Rounds and Shapes.
   5. A572/A572M-15 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
   6. A992/A992M-15 - Structural Shapes.
F. Master Painters Institute (MPI):

1. No. 18 - Primer, Zinc Rich, Organic.

G. Occupational Safety and Health Administration (OSHA):
   1. 29 CFR 1926.752(e) - Guidelines For Establishing The Components Of A Site-Specific Erection Plan.
   2. 29 CFR 1926-2001 - Safety Standards for Steel Erection.

H. Research Council on Structural Connections (RCSC) of The Engineering Foundation:
   1. Specification for Structural Joints Using ASTM A325 or A490 Bolts.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
   1. Show size, configuration, and fabrication and installation details.

C. Sustainable Construction Submittals:
   1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

D. Test Reports: Certify products comply with specifications.
   1. Welders' qualifying tests.

E. Certificates: Certify each product complies with specifications.
   1. Structural steel.
   2. Steel connections.
   3. Welding materials.
   4. Shop coat primer paint.

F. Qualifications: Substantiate qualifications comply with specifications.
   1. Fabricator with project experience list.
   2. Installer with project experience list.
   3. Welders and welding procedures.

G. Delegated Design Drawings and Calculations: Signed and sealed by responsible Architect/Engineer.
   1. Connection calculations.

H. Record Surveys: Signed and sealed by responsible surveyor or engineer.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: AISC Quality Certification participant designated as AISC Certified Plant, Category STD.
   1. Regularly fabricates specified products.

2. Fabricated specified products with satisfactory service on five similar installations for minimum five years.
   a. Project Experience List: Provide contact names and addresses for completed projects.

B. Installer Qualifications: AISC Quality Certification Program participant designated as AISC-Certified Erector, Category ACSE.
   1. Regularly installs specified products.
   2. Installed specified products with satisfactory service on five similar installations for minimum five years.
      a. Project Experience List: Provide contact names and addresses for completed projects.

C. Before commencement of Work, ensure steel erector provides written notification required by OSHA 29 CFR 1926.752(e). Submit a copy of the notification to Contracting Officer's Representative.

D. Welders and Welding Procedures Qualifications: AWS D1.1/D1.1M.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Delegated Design: Prepare submittal documents including design calculations and drawings signed and sealed by registered design professional, licensed in state where project is located.

B. Design structural steel framing connections complying with specified performance:
   1. Load Capacity: Resist loads indicated on drawings.
      a. Request additional design criteria when necessary to complete connection design.
   2. Configuration: Design and detail all connections for each member size, steel grade and connection type to resist the loads and reactions indicated on the drawings. Use details consistent with details shown on drawings, supplementing where necessary. The details shown on drawings are conceptual and do not indicate the required weld sizes or number of bolts unless specifically noted. Use rational engineering design and standard practice in detailing, accounting for all loads and eccentricities in both the connection

and the members. Promptly notify the Contracting Officer Representative of any location where the connection design criteria is not clearly indicated. The design of all connections is subject to the review and acceptance of the Contracting Officer's Representative. Submit structural calculations prepared and sealed by a qualified engineer registered in the state where the project is located. Submit calculations for review before preparation of detail drawings.

2.2 MATERIALS

A. W-Shapes:
   1. ASTM A992/A992M.
   2. ASTM A572/A572M; Grade 50.
B. Channel and Angles:
   1. ASTM A36/A36M.
C. Plates and Bars:
   1. ASTM A36/A36M.
   2. ASTM A572/A572M; Grade 50.
D. Hollow Structural Sections:
   1. ASTM A500/A500M.
E. Bolts, Nuts and Washers: plain finish.
   1. High-strength bolts, including nuts and washers: ASTM A325.
   2. Bolts and nuts, other than high-strength: ASTM A307, Grade A.
   3. Plain washers, other than those in contact with high-strength bolt heads and nuts: ASME B18.22.1.
F. Welding Materials: AWS D1.1, type to suit application.

2.3 PRODUCTS - GENERAL

A. Sustainable Construction Requirements:
   1. Steel Recycled Content: 30 percent total recycled content, minimum.
   2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
      a. Paints and coatings.

2.4 FABRICATION

A. Fabricate structural steel according to Chapter M, AISC 360.
B. Shop and Field Connections:

1. Weld connections according to AWS D1.1/D1.1M. Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.1 to perform type of work required.
2. High-Strength Bolts: High-strength bolts tightened to a bolt tension minimum 70 percent of their minimum tensile strength. Tightening done with properly calibrated wrenches, by turn-of-nut method or by use of direct tension indicators (bolts or washers). Tighten bolts in connections identified as slip-critical using Direct Tension Indicators.

2.5 FINISHES

A. Shop Priming:
   1. Prime paint structural steel according to AISC 303, Section 6.
B. Shop Finish Painting: Apply primer and finish paint as specified in Section 09 91 00, PAINTING.
C. Do not paint:
   1. Surfaces within 50 mm (2 inches) of field welded joints.
   2. Surfaces receiving sprayed on fireproofing.
D. Bolts, Nuts, and Washers Galvanizing: ASTM F2329, hot-dipped.

2.6 ACCESSORIES

A. General: Shop paint steel according to AISC 303, Section 6.
B. Finish Paint System: Primer and finish as specified in Section 09 91 00, PAINTING.

PART 3 - EXECUTION

3.1 ERECTION

A. Erect structural steel according to AISC 303 and AISC 360.
B. Set structural steel accurately at locations and elevations indicated on drawings.
C. Maintain erection tolerances of structural steel within AISC 303 requirements.
D. Weld and bolt connections as specified for shop connections.

3.2 FIELD PAINTING

A. After welding, clean and prime weld areas to match adjacent finish.
B. Touch-up primer damaged by construction operations.
C. Finish Painting: As specified in Section 09 91 00, PAINTING.

3.3 FIELD QUALITY CONTROL

A. Record Survey:

1. Engage registered land surveyor or registered civil engineer as specified in Section 01 00 00, GENERAL REQUIREMENTS to perform survey.
2. Measure and record structural steel framing plumbness, level, and alignment after completing bolting and welding and before installation of work supported by structural steel.
3. Identify deviations from allowable tolerances specified in AISC Manual.

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SECTION 05 31 00

STEEL DECKING

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies material and services required for installation of steel decking as shown and specified.

1.2 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

1.3 DESIGN REQUIREMENTS:

A. Design steel decking in accordance with AISI publication, "Specification for the Design of Cold-formed Steel Structural Members" except as otherwise shown or specified.

B. Design all elements with the latest published version of applicable codes.

1.4 SUBMITTALS:

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

B. Shop Drawings: Shop and erection drawings showing decking unit layout, connections to supporting members, and similar information necessary for completing installation as shown and specified, including supplementary framing, sump pans, ridge and valley plates, cant strips, cut openings, special jointing or other accessories. Show welding, side lap, closure, deck reinforcing and closure reinforcing details. Show openings required for work of other trades, including openings not shown on structural drawings. Indicate where temporary shoring is required to satisfy design criteria.

C. Manufacturer's Literature and Data: Showing steel decking section properties and specifying structural characteristics.

D. Certification: For each type and gauge of metal deck supporting concrete slab or fill, furnish certification of the specified fire ratings. Certify that the units supplied are U.L. listed as a “Steel Floor and Form Unit”.

E. Insurance Certification: Assist the Government in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance.

1.5 QUALITY ASSURANCE:

A. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual Global and are listed in "Factory Mutual Research Approval Guide" for "Class 1" fire rated construction.

1.6 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

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

A36/A36M-08.....Standard Specification for Carbon Structural Steel

ASTM A1008/A1008M-12....Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

A653/A653M-11.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process

C. American Institute of Steel Construction (AISC):

360-10.....Specification for Structural Steel Buildings.

D. American Iron and Steel Institute (AISI):

S100-07.....North American Specification for the Design of Cold-Formed Steel Structural Members, 2007 Edition with Supplement 2.aisc

E. American Welding Society (AWS):

D1.3-08.....Structural Welding Code - Sheet Steel

F. Factory Mutual (FM Global):

1. Loss Prevention Data Sheet 1-28: Wind Loads to Roof Systems and Roof Deck Securement
2. Factory Mutual Research Approval Guide (2002)

G. Military Specifications (Mil. Spec.)

MIL-P-21035B.....Paint, High Zinc Dust Content, Galvanizing Repair

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Steel Decking: ASTM A653, Structural Quality.

B. Galvanizing: ASTM A653, G90 G60.

C. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035B.

D. Miscellaneous Steel Shapes: ASTM A36.

E. Welding Electrode: E60XX minimum.

F. Sheet Metal Accessories: ASTM A653, galvanized, unless noted otherwise. Provide accessories of every kind required to complete the installation of metal decking in the system shown. Finish sheet metal items to match deck including, but not limited to, the following items:

1. Metal Cover Plates: For end-abutting deck units, to close gaps at changes in deck direction, columns, walls and openings. Same quality as deck units but not less than 1.3 mm (18 gauge) sheet steel.
2. Continuous Sheet Metal Edging: At openings, concrete slab edges and roof deck edges. Same quality as deck units but not less than 1.3 mm (18 gauge) steel. Side and end closures supporting concrete and their attachment to supporting steel shall be designed by the manufacturer to safely support the wet weight of concrete and construction loads. The deflection of cantilever closures shall be limited to 3 mm (1/8 inch) maximum.
3. Metal Closure Strips: For openings between decking and other construction, of not less than 1.3 mm (18 gauge) sheet steel of the same quality as the deck units. Form to the configuration required to provide tight-fitting closures at open ends of flutes and sides of decking.
4. Cant Strips: Provide bent metal 45 degree leg cant strips where indicated on the Drawings. Fabricate cant strips from 1 mm (20 gauge) metal with a minimum 125 mm (5 inch) face width.
5. Seat Angles for Deck: Provide where a beam does not frame into a column.
6. Sump Pans for Roof Drains: Fabricated from single piece of minimum 1.9 mm (14 gauge) galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 75 mm (3 inches) wide. Recess pans not less than 38 mm (1 1/2 inches) below roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.

2.2 REQUIREMENTS:

A. Provide steel decking of the type, depth, gauge, and section properties as shown.

B. Metal Roof Deck: Single pan fluted units with flat horizontal top surfaces utilized to act as a permanent support for all superimposed loads. Comply with the depth and minimum gage requirements as shown on the Contract Documents.

1. Wide Rib (Type B) deck.
2. Finish: Galvanized G-60.

C. Do not use steel deck for hanging supports for any type or kind of building components including suspended ceilings, electrical light fixtures, plumbing, heating, or air conditioning pipes or ducts or electrical conduits.

PART 3 - EXECUTION

3.1 ERECTION:

A. Do not start installation of metal decking until corresponding steel framework has been plumbed, aligned and completed and until temporary shoring, where required, has been installed. Remove any oil, dirt, paint, ice, water and rust from steel surfaces to which metal decking will be welded.

B. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

C. Do not use deck units for storage or working platforms until permanently secured. Do not overload deck units once placed.

D. Provide steel decking in sufficient lengths to extend over 3 or more spans.

E. Place steel decking units at right angles to supporting members. End laps of sheets of roof deck shall be a minimum of 50 mm (2 inches) and shall occur over supports.

F. Fastening Deck Units:

1. Fasten floor deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength, spaced not more than 305 mm (12 inches) o.c. with a minimum of two welds per unit at each support. Where two units abut, fasten each unit individually to the supporting steel framework.
2. Tack weld or use self-tapping No. 8 or larger machine screws at 915 mm (3 feet) o.c. for fastening end closures. Only use welds to attach longitudinal end closures.
3. Fasten roof deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength, spaced not more than 305 mm (12 inches) o.c. at every

support, and at closer spacing where required for lateral force resistance by diaphragm action. Attach split or partial panels to the structure in every valley. In addition, secure deck to each supporting member in ribs where side laps occur. Power driven fasteners may be used in lieu of welding for roof deck if strength equivalent to the welding specified above is provided. Submit test data and design calculations verifying equivalent design strength.

4. Mechanically fasten side laps of adjacent roof deck units with spans greater than 1524 mm (5 feet) between supports, at intervals not exceeding 915 mm (3 feet) o.c., or midspan, whichever is closer, using self-tapping No. 8 or larger machine screws.
5. Provide any additional fastening necessary to comply with the requirements of Underwriters Laboratories and/or Factory Mutual to achieve the required ratings.
6. Uplift Loading: Install and anchor roof deck units to resist gross uplift loading of and 1.4 kPa (30 psf) for other roof areas.
7. Weld end laps of corrugated form deck units in valley of side lap and at middle of sheet (maximum spacing of welds is 380 mm (15 inches).
8. Weld corrugated deck to intermediate supports in an X pattern. Weld in valley of side laps on every other support and in the valley of the center corrugation on the remaining supports (maximum spacing of welds is 760 mm (30 inches)).

G. Cutting and Fitting:

1. Cut all metal deck units to proper length in the shop prior to shipping.
2. Field cutting by the metal deck erector is restricted to bevel cuts, notching to fit around columns and similar items, and cutting openings that are located and dimensioned on the Structural Drawings.
3. Other penetrations shown on the approved metal deck shop drawings but not shown on the Structural Drawings are to be located, cut and reinforced by the trade requiring the opening.
4. Make all cuts neat and trim using a metal saw, drill or punchout device; cutting with torches is expressly prohibited.
5. Do not make any cuts in the metal deck that are not shown on the approved metal deck drawings. If an additional opening not shown on the approved shop drawings is required, submit a sketch, to scale, locating the required new opening and any other openings and supports in the immediate area. Do not cut the opening until the sketch has been reviewed and accepted by the COR. Provide any additional

reinforcing or framing required for the opening at no cost to the Government. Failure to comply with these requirements is cause for rejection of the work and removal and replacement of the affected metal deck.

6. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

3.2 WELDING:

Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.3.

3.3 FIELD REPAIR:

1. Areas scarred during erection.
2. Welds to be thoroughly cleaned and touched-up. Touch-up paint for zinc-coated units shall be zinc rich galvanizing repair paint.

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SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies materials and services required for installation of cold-formed steel, including tracks and required accessories as shown and specified. This Section includes the following:

1. Exterior load-bearing steel stud walls.

1.2 RELATED WORK:

A. Structural steel framing: Section 05 12 00, STRUCTURAL STEEL FRAMING.

B. Non-load-bearing metal stud framing assemblies: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

C. Gypsum board assemblies: Section 09 29 00, GYPSUM BOARD.

1.3 DESIGN REQUIREMENTS:

A. Design steel in accordance with American Iron and Steel Institute Publication "Specification for the Design of Cold-Formed Steel Structural Members", except as otherwise shown or specified.

B. Structural Performance: Engineer, fabricate and erect cold-formed metal framing with the minimum physical and structural properties indicated.

C. Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.

1. Design Loads: As indicated.

2. Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Load-Bearing Walls: Lateral deflection of 1/360 of the wall height.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 67 degrees C (120 degrees F).

4. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

5. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal framing by employing a qualified professional engineer to prepare design calculations, shop drawings, and other structural data.

1.4 SUBMITTALS:

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

B. Shop Drawings: Shop and erection drawings showing steel unit layout, connections to supporting members, and information necessary to complete installation as shown and specified.

C. Manufacturer's Literature and Data: Showing steel component sections and specifying structural characteristics.

D. For cold-formed metal framing indicated to comply with certain design loadings, include structural analysis data sealed and signed by the qualified professional engineer who was responsible for its preparation.

1.5 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Iron and Steel Institute (AISI):

Specification and Commentary for the Design of Cold-Formed Steel Structural Members (1996)

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

A36/A36M-08.....Standard Specifications for Carbon Structural Steel

A123/A123M-09.....Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A153/A153M-09.....Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A307-10.....Standard Specifications for Carbon Steel Bolts and Studs

A653/A653M-10.....Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C1107/C1107M-08.....Standard Specifications for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

E488-96(R2003).....Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements

E1190-95(R2007).....Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members

D. American Welding Society (AWS):

D1.3/D1.3M-08.....Structural Welding Code-Sheet Steel

E. Military Specifications (Mil. Spec.):

MIL-P-21035B.....Paint, High Zinc Dust Content, Galvanizing Repair

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Sheet Steel for studs and accessories 16 gage and heavier: ASTM A653, structural steel, zinc coated G60, with a yield of 340 MPa (50 ksi) minimum.

B. Sheet Steel for studs and accessories 18 gage and lighter: ASTM A653, structural steel, zinc coated G60, with a yield of 230 MPa (33 ksi) minimum.

C. Galvanizing Repair Paint: MIL-P-21035B.

D. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, with fluid consistency and a 30 minute working time.

2.2 WALL FRAMING:

A. Steel Studs: Manufacturer's standard C-shaped steel studs of web depth indicated, with lipped flanges, and complying with the following:

1. Design Uncoated-Steel Thickness:

1.20 mm (0.0474 inch)

1.52 mm (0.0598 inch)

(0.0747 inch)

2.66 mm (0.1046 inch)

2. Flange Width:

(1-5/8 inches)

(2 inches)

(2-1/2 inches)

3. Web: Unpunched.

B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, of web depths indicated, with straight flanges, and complying with the following:

1. Design Uncoated-Steel Thickness: Matching steel studs.

2. Flange Width: Manufacturer's standard deep flange where indicated, standard flange elsewhere.

2.3 FRAMING ACCESSORIES:

A. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength of 230 MPa (33 ksi).

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.

2. Bracing, bridging, and solid blocking.

3. Web stiffeners.

4. Gusset plates.

5. Vertical slide clips.

6. Stud kickers and girts.

7. Reinforcement plates.

2.4 ANCHORS, CLIPS, AND FASTENERS:

A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.

B. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.

C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.

D. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws. Low-profile head beneath sheathing, manufacturer’s standard elsewhere.

2.5 REQUIREMENTS:

A. Welding in accordance with AWS D1.3

B. Furnish members and accessories by one manufacturer only.

PART 3 - EXECUTION

3.1 FABRICATION:

A. Framing components may be preassembled into panels. Panels shall be square with components attached.

B. Cut framing components squarely or as required for attachment. Cut framing members by sawing or shearing; do not torch cut.

C. Hold members in place until fastened.

D. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
2. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

E. Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

3.2 ERECTION:

A. Handle and lift prefabricated panels in a manner as to not distort any member.

B. Securely anchor tracks to supports as shown.

C. At butt joints, securely anchor two pieces of track to same supporting member or butt-weld or splice together.

D. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.

E. All axially loaded members shall be aligned vertically to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.

F. Install jack studs above and below openings and as required to furnish support. Securely attach jack studs to supporting members.

G. Install headers in all openings that are larger than the stud spacing in that wall.

H. Attach bridging for studs in a manner to prevent stud rotation. Space bridging rows as shown.

I. Studs in one piece for their entire length, splices will not be permitted.

J. Provide temporary bracing and leave in place until framing is permanently stabilized.

K. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

3.3 TOLERANCES:

A. Vertical alignment (plumbness) of studs shall be within 1/960th of the span.

B. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths.

C. Spacing of studs shall not be more than 3 mm (1/8 inch) +/- from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.

D. Prefabricated panels shall be not more than 3 mm (1/8 inch) +/- out of square within the length of that panel.

3.4 FIELD REPAIR:

Touch-up damaged galvanizing with galvanizing repair paint.

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.

1.2 RELATED WORK

A. Railings attached to steel stairs: Section 05 51 00, METAL STAIRS.

B. Prime and finish painting: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

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

B. Shop Drawings:

1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
3. Provide templates and rough-in measurements as required.

C. Manufacturer's Certificates:

1. Live load designs as specified.

D. Design Calculations for specified live loads including dead loads.

E. Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning of items having anchors to be built into concrete or masonry construction.

1.4 QUALITY ASSURANCE

A. Each manufactured product 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 product type shall be the same and be made by the same manufacturer.

C. Assembled product to the greatest extent possible before delivery to the site.

D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.5 APPLICABLE PUBLICATIONS

A. 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):

B18.6.1-97.....Wood Screws

B18.2.2-87(R2005).....Square and Hex Nuts

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

A36/A36M-12.....Structural Steel

A47-99(R2009).....Malleable Iron Castings

A48-03(R2012).....Gray Iron Castings

A53-12.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

A123-12.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A240/A240M-14.....Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.

A269-10.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A307-12.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A391/A391M-07(R2012)....Grade 80 Alloy Steel Chain

A786/A786M-09.....Rolled Steel Floor Plate

B221-13.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B456-11.....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

B632-08.....Aluminum-Alloy Rolled Tread Plate

C1107-13.....Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

D3656-13.....Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns

F436-11.....Hardened Steel Washers

F468-06(R2012).....Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws and Studs for General Use

F593-13.....Stainless Steel Bolts, Hex Cap Screws, and Studs

F1667-11.....Driven Fasteners: Nails, Spikes and Staples

D. 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

E. National Association of Architectural Metal Manufacturers (NAAMM)

AMP 521-01.....Pipe Railing Manual

AMP 500-06.....Metal Finishes Manual

MBG 531-09.....Metal Bar Grating Manual

MBG 532-09.....Heavy Duty Metal Bar Grating Manual

F. Structural Steel Painting Council (SSPC)/Society of Protective Coatings:

SP 1-04.....No. 1, Solvent Cleaning

SP 2-04.....No. 2, Hand Tool Cleaning

SP 3-04.....No. 3, Power Tool Cleaning

G. Federal Specifications (Fed. Spec):

RR-T-650E.....Treads, Metallic and Nonmetallic, Nonskid

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. Design fabrications to support dead loads of items being supported in accordance with manufacturer's recommendations.

2.2 MATERIALS

A. Structural Steel: ASTM A36.

2.3 HARDWARE

A. Rough Hardware:

1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts.

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.

2.4 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.

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. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.
   h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
2. Welding:
   a. Weld in accordance with AWS.
   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 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.

2.5 SUPPORTS

A. General:
   1. Fabricate ASTM A36 structural steel shapes.
   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.

C. For Coiling Counter Door:
1. Fabricate supports from continuous steel shapes of sizes recommended by manufacturer with attached bearing plates, anchors, and braces as recommended by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Items set into concrete or masonry.
1. Provide temporary bracing for such items until concrete or masonry is set.
2. Place in accordance with setting drawings and instructions.
3. Build strap anchors, into masonry as work progresses.

C. Field weld in accordance with AWS.
1. Design and finish as specified for shop welding.
2. Use continuous weld unless specified otherwise.

D. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.

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.

3.3 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.

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SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies wood blocking, framing, sheathing, furring, nailers, sub-flooring, rough hardware, and light wood construction.

1.2 RELATED WORK:

A. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.

B. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.

C. Metal backing plate to support wall hung items: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

1.3 SUMBITTALS:

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.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Protect lumber and other products from dampness both during and after delivery at site.

B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

C. Stack plywood and other board products so as to prevent warping.

D. Locate stacks on well drained areas, supported at least 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.

1.5 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 Forest and Paper Association (AFPA):
National Design Specification for Wood Construction
NDS-05.....Conventional Wood Frame Construction

C. American Society of Mechanical Engineers (ASME):
B18.2.1-96(R2005).....Square and Hex Bolts and Screws
B18.2.2-87.....Square and Hex Nuts
B18.6.1-97.....Wood Screws
B18.6.4-98(R2005).....Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws

D. American Plywood Association (APA):
E30-07.....Engineered Wood Construction Guide
E. American Society for Testing And Materials (ASTM):
A47-99(R2009).....Ferritic Malleable Iron Castings
A48-03(R2008).....Gray Iron Castings
A653/A653M-10.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
C954-10.....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
C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs
D143-09.....Small Clear Specimens of Timber, Method of Testing
D1760-01.....Pressure Treatment of Timber Products
F844-07.....Washers, Steel, Plan (Flat) Unhardened for General Use
F1667-08.....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 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.

C. 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.

D. 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.

E. 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.

F. 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 STRUCTURAL-USE PANELS

A. Comply with APA.

B. Bearing the mark of a recognized association or independent agency that maintains continuing control over quality of panel which identifies compliance by end use, Span Rating, and exposure durability classification.

C. Wall and Roof Sheathing:

1. APA Rated sheathing panels, durability classification of Exposure 1 or Exterior Span Rating of 16/0 or greater for supports 400 mm (16 inches) on center and 24/0 or greater for supports 600 mm (24 inches) on center.

2.3 ROUGH HARDWARE AND ADHESIVES:

A. 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).

B. Miscellaneous Bolts: Expansion Bolts: C1D, A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Use 13 mm (1/2 inch) bolt unless shown otherwise.

C. Washers

1. ASTM F844.
2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.

D. Screws:

1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.
2. Wood to Steel: ASTM C954, or ASTM C1002.

E. Nails:

1. Size and type best suited for purpose unless noted otherwise. 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.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

A. Conform to applicable requirements of the following:

1. APA for installation of plywood or structural use panels.

B. Fasteners:

1. Bolts:
   a. 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.
   b. Use toggle bolts to hollow masonry or sheet metal.
   c. 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.
2. 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.
3. Power actuated drive pins may be used where practical to anchor to solid masonry, concrete, or steel.
4. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Use metal plugs, inserts or similar fastening.

C. 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.

N. Sheathing:
1. Use plywood or structural-use panels for sheathing.
2. Lay panels with joints staggered, with edge and ends 3 mm (1/8 inch) apart and nailed over bearings as specified.

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SECTION 06 20 00
FINISH CARPENTRY AND MILLWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes the following:
   1. Plastic-laminate clad cabinets and benches.
   2. Solid surface material (countertops and backsplashes, etc.).

1.2 RELATED WORK

A. Framing, furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation: Section 06 10 00, ROUGH CARPENTRY.

B. Quartz countertops and base: Section 09 75 20, QUARTZ SURFACES.

1.3 SUBMITTALS

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

B. Product Data:
   1. For hardboard, medium-density fiberboard, particleboard, plywood, high-pressure decorative laminate, adhesive for bonding plastic laminate, thermoset decorative overlay, cabinet hardware and accessories, and finishing materials and processes. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
   2. Indicate product description, fabrication information and compliance with specified performance requirements.

C. Shop Drawings: Show location of each item, dimensioned plans, elevations, sections, and large-scale details, attachment devices, and other components.
   1. Show details full or half size.
   2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
   4. Show all reveals and trim and indicate method of attachment.

D. Samples:
   1. For each type of product indicated.

E. Certificates:

1. Indicating preservative treatment and/or fire retardant treatment of materials meet the requirements specified.
2. Indicating moisture content of materials meet the requirements specified.
3. Product Certificates signed by fabricator of woodwork certifying that products furnished comply with requirements.

F. List of acceptable sealers for fire retardant and preservative treated materials.

G. Manufacturer's literature and data:
1. Finish hardware
2. Electrical components

1.4 DELIVERY, STORAGE AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

B. Protect lumber and millwork from dampness, maintaining moisture content specified both during and after delivery at site.

C. Store finishing lumber and millwork in weathertight well ventilated structures or in space in existing buildings designated by COR. Store at a minimum temperature of 21^0C (70^0F) for not less than 10 days before installation.

D. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

E. Protect finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective covering.

1.5 APPLICABLE PUBLICATIONS

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

B. American Society of Testing and Materials (ASTM):

A36/A36M-08.....Structural Steel

A53-12.....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

B26/B26M-09.....Aluminum-Alloy Sand Castings

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

C1036-06.....Flat Glass

E84-10.....Surface Burning Characteristics of Building Materials

C. American Hardboard Association (AHA):

A135.4-04.....Basic Hardboard

D. Builders Hardware Manufacturers Association (BHMA):

A156.9-03.....Cabinet Hardware

A156.11-10.....Cabinet Locks

A156.16-08.....Auxiliary Hardware

E. Hardwood Plywood and Veneer Association (HPVA):

HP1-09.....Hardwood and Decorative Plywood

F. National Particleboard Association (NPA):

A208.1-09.....Wood Particleboard

G. American Wood-Preservers' Association (AWPA):

AWPA C1-03.....All Timber Products – Preservative Treatment by Pressure Processes

H. Architectural Woodwork Institute (AWI):

AWI-09.....Architectural Woodwork Quality Standards and Quality Certification Program

I. National Electrical Manufacturers Association (NEMA):

LD 3-05.....High-Pressure Decorative Laminates

J. U.S. Department of Commerce, Product Standard (PS):

PS20-10.....American Softwood Lumber Standard

PS 1-95.....Construction and Industrial Plywood

K. Military Specification (Mil. Spec):

MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated

L. Federal Specifications (Fed. Spec.):

A-A-1922A.....Shield Expansion

A-A-55615.....Shield, Expansion; Nail Expansion (Wood Screw and Lag Bolt Self-Threading Anchors)

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

M. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-505-06 Series...Metal Finishes Manual

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature indicated in "Environmental Requirements" paragraph below, during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Assure that the following inside clear dimensions are maintained on all wall cabinets: Minimum clear inside dimension of 13 inches front to back, unless specifically noted otherwise.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

2.2 LUMBER

A. Grading and Marking:

1. Lumber shall bear the grade mark, stamp, or other identifying marks indicating grades of material.
2. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.

3. The inspection agency for lumber shall be approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Sizes:
1. Lumber Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which product is produced.
2. Millwork, standing and running trim, and rails: Actual size as shown or specified.

C. 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.

2.3 PLYWOOD

A. 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, any species group.
b. Veneer Grade: A-C.
5. Shelving Plywood:
a. Interior Type, any species group.
b. Veneer Grade: A-B.
6. Other: As specified for item.

B. 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:
a. Use Type II (interior) A grade veneer for transparent finish.
b. Use Type II (interior) Sound Grade veneer for paint finish.

2.4 PARTICLEBOARD

A. NPA A208.1

B. Plastic Laminate Particleboard Cores:

1. Use Type 1, Grade 1-M-3, or Type 2, Grade 2-M-2, unless otherwise specified.
2. Use Type 2, Grade 2-M-2, exterior bond, for tops with sinks.

C. General Use: Type 1, Grade 1-M-3 or Type 2, Grade 2-M-2.

2.5 PLASTIC LAMINATE

A. NEMA LD-3.

B. Exposed decorative surfaces including countertops, both sides of cabinet doors, and for items having plastic laminate finish. General Purpose, Type HGL.

C. Cabinet Interiors including Shelving: Both of following options to comply with NEMA, CLS as a minimum.

1. Plastic laminate clad plywood or particle board.
2. Resin impregnated decorative paper thermally fused to particle board.

D. Backing sheet on bottom of plastic laminate covered wood tops: Backer, Type HGP.

E. Post Forming Fabrication, Decorative Surfaces: Post forming, Type HGP.

2.6 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.

2.7 SOLID SURFACE MATERIAL

A..Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Subject to compliance with project requirements, provide products indicated on the Drawings.

2.8 HARDWARE AND ACCESSORIES

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. 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. 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. Adjustable Shelf Standards: B4061 with shelf rest B04083.
d. Concealed Hinges: B1601, minimum 110 degree opening.
e. Butt Hinges: B01361, for flush doors, B01381 for inset lipped doors, and B01521 for overlay doors.
f. Cabinet Door Catch: B0371 or B03172.

2. Cabinet Locks: ANSI A156.11. (install where indicated on Drawings)
   a. Drawers and Hinged Door: E07262.
3. Auxiliary Hardware: ANSI A156.16.
   a. Shelf Bracket: B04041, japanned or enameled finish.
   b. Combination Garment rod and Shelf Support: B04051 japanned or enamel finish.
   c. Closet Bar: L03131 chrome finish of required length.
4. Counter Support Brackets:
   a. Wall mounted steel bracket, powder coat finish in color to be selected by Architect.
   b. Provide minimum one bracket for every 48" of unsupported length of counter.
5. Grommets for Cable Passage through Countertops: 2" diameter molded-plastic caps with slot for wire passage.
6. Cam Hasp Lock: Haefele HAF-235-17-600 or equal, Nickel finish

2.9 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. Moisture content of other materials shall be in accordance with the standards under which the products are produced.

2.10 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.

2.11 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 AWPA Standards.

B. Use Grade A, exterior plywood for treatment.

2.12 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. Plastic Laminate Work:
   a. Factory glued to either a plywood or a particle board core, thickness as shown or specified.
   b. 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.

c. Provide plastic backing sheet on underside of countertops, vanity tops, thru-wall counter and sills including back splashes and end splashes of countertops.
d. Use backing sheet on concealed large panel surface when decorative face does not occur.

9. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
10. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
    a. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
    b. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.
11. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
    a. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
    b. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
12. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

B. Solid Surfacing Material Countertops
1. Grade: Premium.
2. Solid-Surfacing-Material Thickness: 1/2 inch (13 mm) unless indicated otherwise on Drawings.
3. Colors, Patterns, and Finishes: Provide materials and products of solid-surfacing material as indicated on Drawings.

4. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
   a. Fabricate tops with loose backsplashes for field application.
5. Cut openings in countertops for undermount sinks in shop.

C. Quartz Counter Tops:
1. Coordinate with Section 09 75 20, QUARTZ SURFACES.

2.14 PLASTIC-LAMINATE CLAD CABINETS

A. Quality Standard: Comply with AWI Section 400 requirements for laminate-clad cabinets. Grade: Premium

B. Cabinet Construction: Flush overlay
1. Cabinet material: Particleboard
2. Drawer front material: Particleboard
3. Door front material: Particleboard

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
1. Horizontal Surfaces Other than Tops: GP-50, 0.050 inch nominal thickness.
2. Vertical Surfaces: GP-28,0.028 inch nominal thickness.
3. Edges: PVC tape, 0.012 inch minimum thickness matching laminate color, pattern, and finish.

D. Materials for Semi-exposed Surfaces: Provide surface materials indicated below:
1. Surfaces Other than Drawer Bodies: Thermoset decorative overlay.
2. Drawer Sides and Backs: Thermoset decorative overlay.
3. Drawer Bottoms: Thermoset decorative overlay.

E. Colors, Patterns, and Finishes: As indicated on Drawings.

2.15 SHOP FINISHING

A. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated. Grade: Provide finishes of same grades as items to be finished.

B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to

back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including backpriming and removal of packing.

3.2 ENVIRONMENTAL REQUIREMENTS

A. Maintain work areas and storage areas to a minimum temperature of 21^{0}C (70^{0}F) and relative humidity between 25 and 55 percent 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.

3.3 INSTALLATION

A. General:

1. Secure trim with fine finishing nails, screws, or glue as required. Install molding using a panel adhesive for use on wood moldings to adhere to wall surfaces, and an 18 gauge power nail gun to hold molding in place. When conditions do not permit nailing, use trim screws to attach to wall framing. Pre-drill and counterbore all screw heads for screw attachment from underside of trim, where applicable.
2. Set nails for putty stopping. Use washers under bolt heads where no other bearing plate occurs.
3. Fill all fastener holes and open joints with matching wax putty sticks provided by the manufacturer. Wipe off excess wax putty with a clean rag and denatured alcohol.
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. Install plumb, level, and true; shim as required, using concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches. Where millwork abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

7. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.
8. Base Cabinets: Set cabinets straight, plumb, and level. Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust subtops within 1/16 inch of a single plane. Fasten cabinets to partition framing, wood blocking, or reinforcements in partitions with fasteners spaced 24 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch. Where base cabinets are not installed adjacent to walls, fasten to floor at toe space with fasteners spaced 24 inches o.c. Secure sides of cabinets to floor, where they do not adjoin other cabinets, with not less than 2 fasteners.
9. Wall Cabinets: Hang cabinets straight, plumb, and level. Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust fronts and bottoms within 1/16 inch of a single plane. Align similar adjoining doors to a tolerance of 1/16 inch. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
10. Install hardware uniformly and precisely. Set hinges snug and flat in mortises, unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
11. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer to provide unencumbered operation.
12. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
    a. Align adjacent quartz material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
    b. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
    c. Secure backsplashes to tops and to walls with adhesive.
    d. Caulk space between backsplash and wall with sealant.

3.4 ADJUSTING AND CLEANING

A. Repair damaged and defective work, where possible, to eliminate functional and visual defects; where not possible to repair, replace work. Adjust for uniform appearance.

B. Clean, lubricate, and adjust hardware. Adjust doors and drawers to operate easily without binding.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

D. Protect millwork items from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

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SECTION 07 21 13

THERMAL AND ACOUSTICAL 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. Insulation in connection with roofing and waterproofing: Section 07 22 00, ROOF AND DECK INSULATION, 07 13 36 EIP COMPOSITE PRMA

B. Safing insulation: Section 07 84 00, FIRESTOPPING.

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. 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.

1.4 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.

1.5 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 basic designation only.

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

C270-10.....Mortar for Unit Masonry

C552-07.....Cellular Glass Thermal Insulation.

C578-10.....Rigid, Cellular Polystyrene Thermal Insulation

C591-09.....Unfaced Preformed Rigid Cellular Polyisocynurate Thermal Insulation

C612-10.....Mineral Fiber Block and Board Thermal Insulation

C665-06.....Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

C954-10.....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

D312-00(R2006).....Asphalt Used in Roofing

E84-10.....Surface Burning Characteristics of Building Materials

F1667-11.....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.

2.2 MASONRY CAVITY WALL INSULATION:

A. Polyurethane or Polyisocyanurate Board: ASTM C591, Type I, faced with a vapor retarder having a perm rating of not more than 0.5.

B. Polystyrene Board: ASTM C578, Type X.

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.

2.4 ACOUSTICAL INSULATION:

A. Mineral Fiber Batt or Blankets: ASTM C665. Maximum flame spread of 25 and smoke development of 450 when tested in accordance with ASTM E84.

B. Thickness as shown; of widths and lengths to fit tight against framing.

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. Perlite Board: ASTM C728.

D. Cellular Glass Block: ASTM C552, Type I.

2.6 MASONRY FILL INSERTS INSULATION:

A. Expandable polystyrene: ASTM C 578, Type 1.

2.7 SPRAY-ON INSULATION:

A. Spray foam insulation: medium density, water-blown, conforming to the following:

1. Thermal resistance (for one inch of material) (R-value/inch @75 deg F): ASTM C 518; 4.9 hr. sq. ft. degree F/BTU

2. Air permeance (for 1.3 inch of material): ASTM E 2178: <0.00049 L/s.m^2 @75 Pa.

3. Water Vapor Transmission (for 2.4 inches of material): ASTM E 96; less than 1 perm.

4. Resistance to fungal growth: ASTM C 1338: no growth.

5. Flame Spread and smoke developed rating: ASTM E 84

a. Flame Spread: less than 20

b. Smoke development: les than 450

2.8 SEMI-RIGID INSULATION:

A. Foil faced, 4.0 pcf (nominal)

B. Surface Burning Characteristics: ASTM E84, flame spread 0 and smoke-developed of 0. R value per inch of thickness, 4.2.

C. Galvanized safing clips, attachment hardware, reinforcement member and vapor retarder tape.

2.9 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.

2.10 ADHESIVE:

A. As recommended by the manufacturer of the insulation.

B. Asphalt: ASTM D312, Type III or IV.

C. Mortar: ASTM C270, Type 0.

2.11 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 MASONRY CAVITY WALLS:

A. Mount insulation on exterior faces of inner wythes of masonry cavity walls and brick faced concrete walls. Fill joints with same material used for bonding.

B. Bond polystyrene board to surfaces with adhesive or Portland cement mortar mixed and applied in accordance with recommendations of insulation manufacturer.

C. Bond mineral fiberboard, polyurethane or polyisocyanurate board, and perlite board to surfaces with adhesive as recommended by insulation manufacturer.

D. Bond cellular glass insulation to surfaces with hot asphalt or adhesive cement.

3.3 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 wood studs or framing with nails or staples through flanged edges on face of stud. Space fastenings not more than 150 mm (six inches) apart.

E. Ceiling Insulation and Soffit Insulation:

1. At metal framing or ceilings suspension systems, install blanket insulation above suspended ceilings or metal framing at right angles to the main runners or framing. Tape insulation tightly together so no gaps occur and metal framing members are covered by insulation.
2. In areas where suspended ceilings adjoin areas without suspended ceilings, install either blanket, batt, or mineral fiberboard extending from the suspended ceiling to underside of deck or slab above. Secure in place to prevent collapse or separation of hung blanket, batt, or board insulation and maintain in vertical position. Secure blanket or batt with continuous cleats to structure above.

3.5 RIGID INSULATION ON SURFACE OF EXTERIOR WALLS, FLOORS, 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. Bond to solid vertical surfaces with adhesive as recommended by insulation manufacturer. Fill joints with adhesive cement.

C. Use impaling pins for attachment to underside of horizontal surfaces. Space fastenings as required to hold insulation in place and prevent sagging.

D. 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.

3.6 MASONRY FILL INSULATION:

A. Pour fill insulation in cavity voids of masonry units from tops of walls, or from sill where windows or other openings occur.

B. Pour in lifts of not more than 6 m (20 feet).

3.7 ACOUSTICAL INSULATION:

A. Fasten 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.

E. Where semi-rigid insulation is used which is not full thickness of cavity, adhere to one side of cavity maintaining continuity of insulation and covering penetrations or embedments in insulation.

3.8 SPRAY ON INSULATION

A. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 180 deg F per ASTM C 411 or in accordance with authorities having jurisdiction.

B. Clean substrates and cavities of loose materials capable of interfering with insulation placement.

C. Site mix liquid components supplied by manufacturer.

D. Apply insulation to substrates in compliance with manufacturer's written instructions.

E. Apply insulation to produce thickness required for indicated R Value.

F. Extend insulation in thickness indicated to envelop entire area to be insulated.

G. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse.

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SECTION 07 21 23
LOOSE-FILL INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers loose fill insulation, vapor barrier where shown.

1.2 SUBMITTALS

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

B. Samples:

1. Loose fill insulation in pint size containers
2. Blocking: 150 mm (6-inch) long strips

C. Manufacture's Literature:

1. Submit current copies of the insulation manufacturer's printed fact sheet literature, including descriptive data, insulation characteristics, and instructions for installation and protection of insulation.
2. Submit copy of "Bag Label".

1.3 DELIVERY

A. Deliver materials to the site in the original sealed containers or packages bearing the manufacturer's name and brand designation.

B. The containers or packages of insulation shall bear the referenced specification number, type and class as applicable, recommended method of installation (pneumatic or pouring), minimum net weight of insulation, coverage charts, "R" values, and required warning statements.

1.4 STORAGE

A. Inspect materials delivered to the site for damage and unload and store with a minimum of handling.

B. Storage spaces shall be dry locations, not subject to open flames or sparks, and permitting easy access for inspection and handling.

1.5 APPLICABLE PUBLICATIONS

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

B. American Society of Testing and Materials (ASTM):

C728-05 (R2010).....Perlite Thermal Insulation Board

C739-08.....Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation

C764-07.....Mineral Fiber Loose Fill Thermal Insulation

C1015-06.....Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation

D4397-10.....Polyethylene Sheeting for Construction, Industrial, and Agriculture Applications

E84-10.....Surface Burning Characteristics of Building Materials

C. Federal Regulations:

Code of Federal Regulations 29 CFR 1910, Occupational Safety and Health Act (OSHA).

PART 2 - PRODUCTS

2.1 LOOSE FILL INSULATION

A. Cellulosic or Wood Fiber Loose Fill: Flame spread index of not more than 25 and a smoke-developed index of not more than 450.

B. Mineral Fiber Loose Fill: ASTM C764, Type I or II.

2.2 BLOCKING

A. Wood, metal, or other materials approved by the COR.

2.3 RECOVERED MATERIAL

A. The minimum-content standards are based on the weight (not the volume) of the material in the insulating core only.

PART 3 - EXECUTION

3.1 INSPECTION

A. Where possible, inspect ceiling(s) to receive insulation for conditions which will adversely affect the execution of the work or create a safety hazard. Report unsatisfactory conditions to the Contracting officer representative.

B. Do not install insulation until unsatisfactory conditions have been corrected.

C. Follow ASTM C1015. The inspection shall include checking for the following:

1. Defects in electrical fixtures, equipment, wiring, junction boxes, receptacles, and switches that will cause hazards.
2. Openings through which the loose fill insulation material may escape.
3. Air ducts which appear to have joints that are not secure or sealed.

3.2 INSTALLATION

A. Insulation:

1. Install insulation in accordance with ASTM C1015 and the requirements specified.
2. Do not install insulation until the requirements specified in the INSPECTION and PREPARATION paragraphs have been carried out and any defects which were identified have been corrected and their cause eliminated.

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SECTION 07 22 00

ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This portion of the specification describes materials and workmanship required for the installation of roof and deck insulation, tapered insulation, cants, insulation accessories, adhesives and fasteners, drainage board, cover board and composite cementitious board and insulation pavers.

B. Roof Areas 6A, 6B, 6C and 6D: Pre-manufactured drainage board, roof insulation and composite cementitious board & insulation pavers on new roofing and water proofing membrane to constructed a completed Protected Roof Membrane Assembly (PRMA) roofing system. Composite cementitious board and insulation pavers ballast (composite paver panel) system consists of a tongue and groove concrete panel laminated to an insulation board providing protection from thermal shock, weathering forces and maintenance related foot traffic as specified herein and shown on the Drawings.

C. Roof Areas 7A and 7B: Roof Insulation, tapered roof insulation, saddles and crickets, and cover board on metal deck ready to receive a new roofing membrane.

D. Roof area 6-Gutter: Roof insulation, tapered roof insulation and cover board on concrete deck at the gutter system along the north roof perimeters ready to receive a new roofing membrane.

E. Insulation systems shall comply with thicknesses related to the average R values shown in section 1.4.A, below.

1.2 RELATED WORK

A. Wood cants, blocking, and edge strips: Section 06 10 00, ROUGH CARPENTRY.

B. Sheet metal components, fabrication, and wind uplift requirements for roof-edge and all other flashing and sheet metal fabrications: Section 07 60 00, FLASHING AND SHEET METAL.

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. American Society of Heating, Refrigeration and Air Conditioning (ASHRAE):

90.1-07 .....Energy Standard for Buildings Except Low-Rise Residential Buildings

C. ASTM International (ASTM):

ASTM E96.....Standard Test Methods for Water Vapor Transmission of Materials.

C208-08 .....Cellulosic Fiber Insulating Board

ASTM C272.....Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.

ASTM C518.....Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

ASTM C578.....Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

C552-07 .....Cellular Glass Thermal Insulation

C726-05 .....Mineral Fiber Roof Insulation Board

C728-05 .....Perlite Thermal Insulation Board

C1177/C1177M-08 .....Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing

C1278/C1278M-07 .....Standard Specification for Fiber-Reinforced Gypsum Panel

C1289-10 .....Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

C1396/C1396M-09 .....Standard Specification for Gypsum Board

D41-05 .....Asphalt Primer Used in Roofing, Damp-proofing, and Waterproofing

D312-06 .....Asphalt Used in Roofing

ASTM D448..... Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

ASTM D1621..... Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

D1970-09 .....Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

ASTM D2103..... Standard Specification for Polyethylene Film and Sheeting.

D2178-04 .....Asphalt Glass Felt Used in Roofing and Waterproofing

D2822-05 .....Asphalt Roof Cement

D4586-07 .....Standard Specification for Asphalt Roof Cement, Asbestos-Free

E84-09 .....Standard Test Method for Surface Burning Characteristics of Building Material

F1667-05 .....Driven Fasteners: Nails, Spikes, and Staples

D. FM Approvals: RoofNav Approved Roofing Assemblies and Products.

4450-89 .....Approved Standard for Class 1 Insulated Steel Deck Roofs

4470-10 .....Approved Standard for Class 1 Roof Coverings

1-28-09 .....Loss Prevention Data Sheet: Design Wind Loads.

1-29-09 .....Loss Prevention Data Sheet: Above-Deck Roof Components

1-49-09 .....Loss Prevention Data Sheet: Perimeter Flashing

E. National Roofing Contractors Association: Roofing and Waterproofing Manual

F. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory (2009)

G. U.S. Department of Commerce National Institute of Standards and Technology (NIST):

DOC PS 1-09 .....U.S. Product Standard for Construction and Industrial Plywood

1.4 PERFORMANCE REQUIREMENTS

A. Thermal Performance: Provide roof insulation meeting minimum overall average R-values as outlined below, with a minimum insulation thickness of 1-1/2 inches at roof drains per VAMC requirements.

1. Roof Areas 6A, 6B, 6C, 6D — Average R-Value: R-30
2. Roof Areas 7A and 7B — Average R-Value: R-15
3. Roof Areas 6-Gutters — Average R-Value: R-15

B. FM Approvals: Provide roof insulation complying with requirements in FM Approvals 4450 and 4470 as part of specified roofing system, listed in FM Approvals "RoofNav" as part of roofing system meeting fire classifications and wind uplift rating resistance requirements.

C. Composite Paver Panels: extruded polystyrene insulation shall comply with ASTM C578 and exhibit the following qualities of physical resistance:

a. Thermal Resistance (aged R-value) (ASTM C518): 5 per inch at 75F

b. Compressive Strength (ASTM D1621): 40 psi, minimum

c. Water Absorption (ASTM C272): 0.1% average

d. Water Vapor Permeance (ASTM E96): 0.6 perm - inch, average.

C. Wind uplift pressures for the roof system components at the field, perimeter and corner conditions: As shown.

D. Wind uplift rating design requirements: Design roof system components for wind uplift ratings (FM Ratings) at the field, perimeter and corner conditions: As shown.

1.5 QUALITY CONTROL

A. Requirements of Division 07 roofing section for qualifications of roofing system installer; Work of this Section shall be performed by same Installer.

B. Unless specified otherwise, comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to insulation for storage, handling, and application.

C. Composite paver panel systems anchorage design and fabrication shall comply with the requirements of Section 07 60 00 Flashing and Sheet Metal.

1.6 SUBMITTALS

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

B. Product Data:

1. Roof insulation, each type.
2. Drainage mat, each type.
3. Cover board, each type.
4. Insulation accessories, each type
5. Adhesive materials, each type.
6. Roofing cement, each type.
7. Fasteners, each type.
8. Fastening requirements.
9. Insulation span data for flutes of metal decks.
10. Composite paver panels, paver panel accessories, anchorage systems and finish systems.

B. Shop Drawings: Include plans, sections, details, and attachments.

1. Nailers, cants, and terminations.
2. Insulation Layout Drawings showing slopes, tapers, penetration, and edge conditions.
3. Composite paver panel drawings showing layout, profiles and product components, including anchorage components, anchorage requirements, fasteners, accessories and finishes of system to be installed.

C. Samples:
   1. Roof insulation, each type.
   2. Fasteners, each type.
   3. Composite Paver Panels, selection and verification samples for finishes, colors and textures.

D. Certificates:
   1. Indicating type, thermal conductance, and minimum and average thickness of insulation.
   2. Indicating materials and method of application of insulation system meet the requirements of FM Approvals for specified roofing system, including, but not limited to, wind uplift resistance requirements)
   3. Composite paver panel system:
      i. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties (including wind uplift rating resistance as required).
      ii. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
      iii. Manufacturer’s Instructions: Manufacturer’s installation instructions. Include manufacturer’s specifications, standard detail and installation instructions for specified materials.
         a. Field Reports: Submit reports of field inspections by the manufacturer’s authorized representative.

E. Laboratory Test Reports: Thermal values of insulation products.

F. Layout of tapered roof system showing units required.

G. Documentation of supervisors' and inspectors' qualifications.

1.7 DELIVERY, STORAGE AND MARKING

A. Comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to built-up roofing for storage, handling and installation requirements.

B. Ordering: Comply with manufacturer’s ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact. Afford materials the degree of preservation, packaging and packing necessary to prevent deterioration and/or

damage that might result from the hazards to which they will be subjected during shipment, handling and storage. Material received that is not dry or is

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Store materials in a dry, weatherproof and well-ventilated place. Do not store or stack material on roof decks in concentrations in excess of design live loadings. Do not leave unprotected materials on the roof overnight. Protect insulation from exposure to sunlight and fire ignition. Remove and replace damaged materials as directed or as necessary. Storage under polyethylene or similar non-breathing film stock shall not be permitted. Proper storage on or off the site shall be the responsibility of the roofing Contractor. Any unused insulation remaining on the roof at the end of the workday shall be returned to storage.

1.8 QUALITY ASSURANCE:

A. Roof Insulation: Roof insulation shall have a flame spread rating not greater than 75 and a smoke developed rating not greater than 150, exclusive of covering, when tested in accordance with ASTM E84, or shall have successfully passed FM Approvals 4450.

1. Insulation bearing the UL label and listed in the UL Building Materials Directory as meeting the flame spread and smoke developed ratings will be accepted in-lieu-of copies of test reports.
2. Compliance with flame spread and smoke developed ratings will not be required when insulation has been tested as part of a roof construction assembly of the particular type used for this project and the construction is listed as fire-classified in the UL Building Materials Directory or listed as Class I roof deck construction in the FM Approvals "RoofNav."
3. Insulation tested as part of a roof construction assembly shall bear UL or FM labels attesting to the ratings specified herein.

B. Composite Paver Panels:

1. Qualifications:

a. Installer Qualifications: Composite paver panels and sheet metal work shall be installed by a single installer that is certified by the manufacturer for installation of a fully warranted roof system (including the composite paver panels) in accordance with specified roof warranty requirements or otherwise accepted in writing by the manufacturer.

b. Manufacturer Qualifications: Manufacturer capable of providing field

service representation during construction, approving acceptable installer and approving application method.

C. Regulatory Requirements:

1. Fire Retardancy: Together with the roof deck, roof membrane, insulation and composite panel pavers assembly shall comply with requirements for a Class A roof.
2. Wind Resistance: The complete roof assembly shall comply with the wind uplift rating specified.

D. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, roof assembly system, composite paver panel manufacturer's installation instructions and manufacturer's warranty requirements.

1.10 MAINTENANCE

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.

1. Quantity: Furnish quantity of 100 units equal to 5% of amount installed, which ever is less.
2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 - PRODUCTS

2.1 ROOF AND DECK INSULATION

A. Roof and Deck Insulation, General: Preformed roof insulation boards approved by roofing manufacturer and listed as component of FM Approvals-approved roofing system.

B. Extruded Polystyrene Insulation (for use with Protected Roof Membrane Assembly (PRMA)): ASTM C 578, drainage edges on all four sides of bottom of panel; of characteristics, indicated below:

1. Type VII, 2.2-lb/cu. ft. minimum density and 25-psi minimum compressive strength.
2. Water Absorption must be maximum 0.1% by volume when tested in accordance with ASTM C-272 criteria.
3. Board Dimension: 4' x 8'
4. The insulation must offer min R-5.0 per inch at 75° F mean temperature when

tested in accordance with ASTM C-518 and be warranted by the manufacturer to retain at least 80% of its published R-value for the warranty period.

5. Note one layer of 3 inch layer of insulation shall be installed on the entire roof area.

C. Polyisocyanurate Board Insulation (For use with conventional SBS Modified Bituminous Roof Assembly): ASTM C1289, Type II, Class 2, Grade 2, glass-fiber mat facer on both major surfaces.

D. Tapered Roof Insulation System: ASTM C 1289, Type II, Class 2, Grade 2; glass fiber mat facer on both major surfaces.

1. Fabricate of polyisocyanurate as specified above. Use only one insulation material for tapered sections. Use only factory-tapered insulation.
2. Cut to provide high and low points with crickets and slopes as required maintaining positive slope to roof drains.
3. Minimum thickness of tapered sections; 1-1/2 inch.
4. Maximize board size 4 feet by 4 feet where fully adhered.
4. Minimum slope 1:48 (1/4 inch per 12 inches for taper and ½ inch per 12 inches for saddles and crickets); .

E. Cover Board:

1. Glass-mat, water-resistant gypsum roofing substrate, 5/8-inch thick, factory primed and approved by the roofing membrane manufacturer for use with their system assembly and complying with the following:
   a. Compressive Strength, ASTM D 1621, ($\geq$ 600 psi)
   b. Dimensional Stability, ASTM D 2126, (9 x 10-6 in/in°F)
   c. Flame Spread, ASTM E 84, (0)
   d. Water Absorption, ASTM C 1177, ($\leq$ 10%)
   e. Thermal Resistance, ASTM C 518/PIMA CP 101 (Report)

F. Rock Wool Insulation:

1. General: Inorganic, mineral based safing insulation to be installed as shown at expansion joints above the vapor retarder and insulation retainer for fire resistance-rated floor assemblies. Material shall be noncombustible, moisture-resistant, noncorrosive, non-deteriorating, mildew-proof with a fire resistive rating of 3-hrs.
2. Rock or Mineral wool insulation, un-faced, with density of 8.0 pcf (nominal), with a minimum R-value: of 4.2 per inch, compressed and fitted into the joint openings, leaving no voids.

3. Surface-Burning Characteristics: ASTM E 84. Un-faced material will have a maximum flame spread 0 and smoke-developed of 0. .

2.2 INSULATION ACCESSORIES

A. Cants and Tapered Edge Strips:

1. Wood Cant Strips: Refer to Division 06 Section "Rough Carpentry."
2. Insulation Cant Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.
3. Tapered Edge Strips: 1:12 (one inch per foot), from 0 inches, 12 inches to 18 inches wide.
   a. Cellulosic Fiberboard: ASTM C208.
   b. Mineral Fiberboard: ASTM C726.
   c. Perlite Board: ASTM C728.

B. Backer Rod: Preformed closed-cell backer-rod, joint filler, as approved by manufacturer.

2.3 ADHESIVE MATERIALS

A. Adhesive Materials, General: Two-part adhesive and sealant materials recommended by roofing system manufacturer for intended use, identical to materials utilized in approved listed roofing system, and compatible with roofing membrane. Adhesives shall be applied with bead sizes and patterns to achieve wind uplift resistance as specified for all layers.

1. Liquid-type adhesive materials shall comply with VOC limits of authorities having jurisdiction.
2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   a. Plastic Foam Adhesives: 50 g/L.
   b. Multipurpose Construction Adhesives: 70 g/L.
   c. Fiberglass Adhesives: 80 g/L.
   d. Contact Adhesives: 80 g/L.
   e. Other Adhesives: 250 g/L.
   f. Non-membrane Roof Sealants: 300 g/L.
   g. Sealant Primers for Nonporous Substrates: 250 g/L.
   h. Sealant Primers for Porous Substrates: 775 g/L.

B. Primer: As recommended by manufacturer for the intended application

C. Bead-Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multi-component urethane adhesive

formulated to attach roof insulation and cover board to substrate or to another insulation layer.

D. Full-Spread Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

E. Roof Cement: Asbestos free, ASTM D2822, Type I or Type II; or ASTM D4586, Type I or Type II.

2.4 INSULATION FASTENERS

A. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion resistance provisions of FM Approvals 4470, designed for fastening substrate or insulation boards to roof deck and complying with wind uplift requirements.

2.5 PRE-FABRICATED DRAINAGE BOARD (PRMA Roof System)

A. Prefabricated Drainage Board: Shall be a composite drainage board consisting of a polypropylene core of fused, entangled filaments covered with a geo-composite filter fabric on its upper surface to allow water to pass into the drainage core while restricting the movement of soil particles and suitable for use in the horizontal application, as shown. Characteristics shall comply with the following:

Properties	Standards
Core:	
Thickness - 0.45 inch	ASTM D-1777
Comp Strength > 30.0ksf	ASTM D-1621
Flow @3000psf & 1.0Gradient, 16gpm/ft	ASTM D-4716
Fabric:	
Flow Rate - 120 gpm/ft2	ASTM D-4491
Grab Tensile Strength, 120 lbs	ASTM D-4632
Apparent Opening Size (AOS), 70 sieve	ASTM D-4751

2.6 COMPOSITE PAVER PANELS (PRMA Roof System)

A. Composite pavers panels shall comply with the following:

1. Manufacturer and System: T-Clear Corporation, Lightguard composite paver panel system.
2. Panels Thickness: 3/8 inch of latex modified concrete panel laminated to Styrofoam closed-cell extruded polystyrene insulation board, ASTM C578, Type VI, 3 inches.

3. Panel Size: 2 feet × 4 feet by 2 3/8 inches.
4. Panel Weight: 4.5 psf.
5. Color: Natural gray or tan (provide submittals for the COR's selection)
6. Shapes: Flat and rectangular, with tongue-and-groove edges allowing for interlocking construction.
7. Configuration: Interlocking
8. Designed by manufacturer to provide wind uplift rating resistance as Required.
9. Accessories: As required by manufacturer to provide wind uplift rating resistance, as required.

B. Metal Perimeter Securement and Metal Strapping.

1. Perimeter Securement: Not less than 22 gauge, ASTM grade 304 stainless steel sheet metal securement shapes and perimeter hold-down anchors, as shown, and as approved by the manufacturer of the composite paver panel systems. Metal securement components shall have a maximum continuous length of 12 ft.
2. Metal Straps: Not less than 22 gauge, ASTM grade 304 stainless steel sheet straps or others as approved by the manufacturer of the composite paver panel system. Metal securement components shall have a maximum continuous length of 12 ft.
3. Fasteners:
   a. For perimeter securement and securing metal straps to the composite paver panel system, contactor shall use Fabco "Fab-Lok EZJ250", Olympic Fastening Systems, Inc., "Bulb Tite" blind rivet RV6604-8-10, or SFS Intec "TPR" or "TPR2" for HG "Peel Rivet", as required.
   b. Fasteners for attachment of metal securement to structure shall be:
      i. TAPCON with Climaseal coating, ITW BUILDEX, Olympic RUFF-NEX part #RNA-134-3 or approved equal
      ii. A minimum 3/16" diameter
      iii. Penetrated a minimum of 1-1/4" into substrate (treated wood, brick or concrete).
   c. Spacing shall be provided as required by manufacturer to provide wind uplift rating resistance, as required.
   Other: Furnish fasteners required for a complete installation in required quantities and varieties.
   d. Fasteners shall have a minimum pull out resistance of 200# per fastener

e. Nails are not acceptable

PART 3 - EXECUTION

3.1 EXAMINATION

A. Comply with requirements of Section 07 01 50 Preparation for Re-Roofing.

3.2 PREPARATION

A. Comply with requirements of Section 07 01 50 Preparation for Re-Roofing

3.3 DRAINAGE MAT, INSULATION, COMPOSITE PAVER PANELS (PRMA ROOF ASSEMBLY – FLOOR 6)

A. General

1. After installation of the specified vapor barrier / temporary roof membrane, base sheet and cap sheet, install roof system 'overburden' assembly materials (drainage mat, insulation and composite paver panels)
2. Examine all areas to receive overburden materials. Insure that all areas are free from defect and have successfully completed a flood test. Verify that all components of the system are properly installed, fully completed, undamaged, and intact.
3. The drainage mat, insulation, and all other topping materials shall be installed as each area is completed.

B. Drainage Mat

1. Install specified drainage mat to lay flat. Cut to fit all penetrations, curbs and perimeters within 3/4 inches. Install on horizontal surfaces with the filter fabric up in accordance with the membrane manufacturer's written instructions. Spot adhere as required with approved adhesive.

C. Insulation Placement

1. Install one (1) 3-inch layer of rigid insulation for required thickness of base insulation layer. Stagger all joints, cut and fit to within 3/4 inch of all projections, perimeter walls and penetrations. Insulation is to be loose laid and tightly butted with joints not greater than 3/8 inch.
2. Multi-layer insulation applications require the bottom layer of insulation to be the thickest layer and shall be a minimum of 2" thick. All layers shall be loose laid with the joints of the second layer, staggered and offset from all joints of the preceding layer. Each successive layer shall be offset from the underlying layer(s) a minimum of 6 inches.

D. Composite Paver Panels

1. Manufacturer's Instructions

a. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

2. Installation

a. Installing Composite Paver Panels: Install Composite paver panels in strict accordance with manufacturer's current printed instructions. Make long joints (length of board) continuous. Stagger side joints. Fit boards carefully to avoid cracks or openings. Sides of boards shall be tightly butted to adjacent board. Extend boards to within 1/4 inch - 1/2 inch of projections. Comply with the manufacturer's installation instructions.

3. Installing Perimeter Securement:

a. General: Install perimeter securement (minimum 22 gauge stainless steel metal shapes, as shown), in strict accordance with composite paver panel manufacturer's printed instructions for the particular conditions of installation. If conditions are encountered where no such written instructions clearly apply, obtain written direction from the manufacturer before proceeding.

b. When the 4 foot long direction of the board runs parallel to the perimeter, pavers shall be placed with their outside edge centered on the perimeter board (covering the first board joint). When the 2 foot long direction of the board runs parallel to the perimeter, the pavers shall be a minimum of 12 inches in length from the last joint to the edge of the perimeter.

c. Perimeter securement shall be installed with fasteners that are approved by the paver manufacture, installed with fasteners are no less than six (6) inches from the perimeter vertical surface. Fasteners spacing shall be spaced as required by the composite paver panel manufacturer as required satisfying the wind uplift resistance requirements.

4. Locating Interior Metal Straps:

a. Install three (3) inch, 22 gauge, stainless steel, metal straps at all openings greater than 3 feet.

E. FIELD QUALITY REQUIREMENTS

A. Inspection: An authorized representative of the manufacturer who is to furnish the single source roof warranty shall inspect roofing work in progress and at final completion as outlined in Section 07 52 16.3.10 – SBS

Modified Bituminous Roofing, Heat Welded. Final inspections shall occur prior to issuance of roofing warranty.

F. CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean the installed products in accordance with manufacturer’s instructions prior to the Owner’s acceptance. Remove construction debris from project site and legally dispose of debris.

1. At the end of the construction period, remove debris and excess materials from the Owner’s property. Inspect the roofing system. Repair or replace deteriorated, damaged or defective work.

G. PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

3.4 RIGID INSULATION INSTALLATION (CONVENTIONAL ROOF ASSEMBLIES – FLOOR 7 AND 6-G)

A. Insulation Installation, General:

1. Install roof insulation in accordance with roofing system manufacturer's written instructions.
2. Install roof insulation in accordance with requirements of FM Approval's Listing for specified roofing system.
3. All insulation materials must be approved by the manufacturer of the primary roof membrane materials. Samples should be provided to the manufacturer and written approval from the manufacturer is required before ordering these materials for the project.
4. Insulation boards shall be full size except when cutting is required at roof edges and openings. Boards that are broken, cracked, have been exposed to moisture, or are otherwise damaged shall not be used.
5. The proper installation and fit of wood nailers, blocking, and other rough carpentry in appropriate locations shall be verified prior to installation of roof insulation.
6. Cant Strips: Install preformed insulation or wood cant strips at junctures of roofing system with vertical construction, as required by manufacturer.
7. Caution shall be exercised with construction traffic to avoid damage to new insulation. Breaking or crushing of insulation is unacceptable and any damaged insulation shall be replaced at the roofing Contractor's expense.
8. Insulation shall be laid with end joints staggered and all joints tight;

however, boards shall not be forced into place.

9. No more insulation shall be installed during any work period than can be covered by the base ply of roofing during the same work period. At the end of the work period, temporary edge seals shall be installed to protect the roof insulation. Upon resumption of work, they must be removed. Such seals shall consist of strips of roofing felt applied and top coated with asphalt mastic.
10. Insulation surfaces shall be cleared of all debris and swept clean before roofing is placed.

B. Insulation Thickness:

1. Thickness of roof insulation shown on drawings is nominal. Actual thickness shall provide the average thermal resistance "R" value of not less than that specified in Performance Requirements Article.
2. Insulation on Metal Decks: Provide the minimum thickness of insulation for metal decks recommended by the insulation manufacturer to span rib opening (flute size) of metal deck used. Support edges of insulation on metal deck ribs.
3. When thickness of insulation to be used is more or less than that shown on the drawings, make adjustments in the alignment and location of roof drains, flashing, gravel stops, fascias and similar items at no additional cost to the Government.
4. Where tapered insulation is used, the thickness of the insulation at high points and roof edges shall be as shown on the drawings; the thickness at the low point (drains) shall be not less than 1-1/2 inches.
5. Use not less than two layers of insulation when insulation is 2.7 inches or more in thickness unless specified otherwise. Stagger joints a minimum of 6 inches.

C. Lay insulating units with closed joints, in regular courses and with cross joints broken. When laid in more than one layer, break joints of succeeding layers of roof insulation with those in preceding layer.

D. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the roofing membrane.

E. Cut to fit tight against blocking or penetrations.

F. Seal all cut edges at penetrations and at edges against blocking with bitumen or roof cement.

G. Cover all insulation installed on the same day; comply with temporary protection requirements of Division 07 roofing section.

H. Installation Method:

1. Mechanically Fastened Insulation:
   a. Fasten insulation in accordance with FM Approval's "RoofNav" requirement in Division 07 roofing section.
   b. Fasten insulation to resist uplift requirements as specified or shown.
2. Adhered Insulation:
   a. Prime substrate as required.
   b. Set each layer of insulation firmly in ribbons of bead-applied insulation adhesive.
   c. Set each layer of insulation firmly in uniform application of full-spread insulation adhesive.
3. Mechanically Fastened and Adhered Insulation *(Roof Sections 7A and 7B):*
   a. Fasten first layer of insulation according to "Mechanically Fastened Insulation" requirements.
   b. Fasten each subsequent layer of insulation according to "Adhered Insulation" requirements.

I. Cover Board: Install cover boards over insulation with long joints in continuous straight lines with staggered end joints. Offset cover board joints from insulation joints a minimum of 6 inches. Fasten cover boards according to "Adhered Insulation" requirements.

- - - E N D - - -

SECTION 07 46 00
SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fiber-cement siding.
2. Fiber-cement soffit and trim.
3. Fiber-cement rain screen system siding

B. Related Sections:

1. Section 06 10 00 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
2. Section 06 16 00 "Sheathing" for wall sheathing
3. Section 07 25 00 “Weather Barriers” for weather-resistive barriers.
4. Section 07 92 00 "Joint Sealants" for weathertight barrier.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Verification: For each type, color, texture, and pattern required.

1. 12-inch- (300-mm-) long-by-actual-width Sample of siding.
2. 12-inch- (300-mm-) long-by-actual-width Samples of trim and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of siding and soffit, from manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

C. Research/Evaluation Reports: For each type of siding required.

D. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of siding and soffit and related accessories to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish full lengths of siding and soffit including related accessories, in a quantity equal to 2 percent of amount installed.

1.7 QUALITY ASSURANCE

A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

B. Source Limitations: Obtain each type, color, texture, and pattern of siding and soffit, including related accessories, from single source from single manufacturer.

1.8 **DELIVERY, STORAGE, AND HANDLING**

A. Store materials in a dry, well-ventilated, weathertight place.

1.9 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.10 WARRANTY

A. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding and] soffit that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including cracking and deforming.
    b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Basis-of-Design Product: Subject to compliance with requirements, provide James Hardie ; HardiePlank HZ5 lap siding, shingle siding, and trim boards or comparable product by one of the following:

    a. Cemplank.
    b. CertainTeed Corp.
    c. MaxiTile, Inc; a California corporation.
    d. Nichiha Fiber Cement.

2. Lap Siding (Horizontal Pattern): Boards 4-inch and 6-inch exposure wide in plain style in pattern as indicated on the elevations.

    a. Texture: Wood-grain.
    b. Color: As selected by Architect from manufacturer’s full range of colors.

3. Trim Boards: Basis-of-Design Product: HardieTrim 4/4 Boards, sized as indicated on Drawings.

    a. Texture: Smooth.
    b. Color: As selected by Architect from manufacturer’s full range of colors.

4. Aluminum Outside/ Inside corner Trims and Window Jamb Trims: Basis-of-Design Product: Fry-Reglet sized as indicated on Drawings.

    a. Texture: Smooth.
    b. Color: As selected by Architect from manufacturer’s full range of colors.

2.2 FIBER-CEMENT SIDING RAIN SCREEN SYSTEM

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Nichiha Cement Siding Rain Screen System or comparable product by one of the following:
   a. Nichiha Fiber Cement – Vintage Wood Siding

   b. Finish: Pre-Finished Wood-grain.
   c. Color: "Bark" or as selected by Architect

2. Horizontal Pattern: Boards 18 inch wide in style.

   a. Thickness: 5/8 inch.

   b. Weight: 37.9 lbs. per panel.

   c. Coverage" 9 sf per panel.

   d. Installation Pattern and details: As indicated on the drawings.

3. Trim & Accessories: Nichha aluminum trim as indicated on drawings
   a. Color: As selected by Architect from manufacturer's full range of colors.

2.3 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories **made from same material as matching color and texture of** adjacent siding unless otherwise indicated.

B. Aluminum Accessories: Where aluminum accessories are indicated, provide accessories complying with AAMA 1402.

1. Texture: **Smooth.**
2. Nominal Thickness: **0.019 inch (0.5 mm).**
3. Finish: Manufacturer's standard **primer and baked-on acrylic.**

C. Colors for Decorative Accessories: **As selected by Architect from manufacturer's full range of industry colors.**

D. Flashing: Provide **aluminum** flashing complying with Section 076200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

E. Fasteners:

1. For fastening to wood, use **siding nails** and or **ribbed bugle-head screws** of sufficient length to penetrate a minimum of 1 inch (25 mm) into substrate.
2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch (6 mm), or three screw-threads, into substrate.
3. For fastening fiber cement, use **stainless-steel** fasteners.

2.4 ACCESSORIES

A. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated, sized as per drawings:
   1. Fasciae.
   2. Moldings and trim.

B. Colors for Decorative Accessories: As selected by Architect from manufacturer's full range of colors.

C. Flashing: Provide aluminum flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

   1. Finish for Aluminum Flashing: Siliconized polyester coating, same color as siding.

D. Fasteners:

   1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1 inch (25 mm) into substrate.
   2. For fastening fiber cement, use hot-dip galvanized fasteners.

E. Insect Screen. Provide insect screen at bottom of furring stips

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and soffit and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with siding and soffit manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Do not install damaged components.

B. Install fiber-cement siding and soffit and related accessories.

1. Install fasteners no more than 24 inches (600 mm) o.c..

C. Install joint sealants as specified in Section 07 92 00 "Joint Sealants" and to produce a weathertight installation.

3.4 **ADJUSTING AND CLEANING**

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

---END---

SECTION 07 52 16
STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS ROOFING HEAT WELDED

PART 1 - GENERAL

1.1 DESCRIPTION:

A. General: This section includes the installation of vapor retarder, base plies, inter-plies and cap sheets of modified bituminous roofing membrane sheets with base flashing system installed using torch-applied application. Fluid applied flashing system is also described in this section. Surfacing for membrane that is exposed to UV is ceramic granules.

B. Roof Areas 6A, 6B, 6C AND 6D: Pre-manufactured drainage board, roof insulation and composite paver panels on new roofing membrane to construct a completed Protected Roof Membrane Assembly (PRMA) roofing system.

C. Roof Areas 7A and 7B Systems: Roof insulation, tapered insulation, cover board and a torch-applied two-ply roofing membrane over existing metal deck.

D. Roof Area 6-Gutter System: Vapor retarder, roof and deck insulation, tapered insulation and cover board on an existing concrete gutter system to receive new roofing membrane.

E. Insulation systems shall comply with thicknesses related to the average R values shown in section 1.4.A, below.

1.2 RELATED WORK:

A. Wood cants, blocking and wood edge strips: Section 06 10 00, ROUGH CARPENTRY.

B. Roof Insulation under Membrane: Section 07 22 00, ROOF AND DECK INSULATION.

C. Sheet metal components and wind uplift requirements for roof-edge design: Section 07 60 00, FLASHING AND SHEET METAL.

D. Miscellaneous items: Section 07 71 00, ROOF SPECIALTIES/ Section 07 72 00, ROOF ACCESSORIES.

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. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
ANSI/SPRI ES-1-03 .....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):

ASCE/SEI-7-10 .....Minimum Design Loads for Buildings and Other Structures

D. Asphalt Roofing Manufacturers Association/National Roofing Contractors Association (ARMA/NRCA): Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing

E. ASTM International (ASTM):

C67-09 .....Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile

C140-09 .....Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

C1370-00(R2005) .....Standard Test Method for Determining the Chemical Resistance of Aggregates for Use in Chemical-Resistant Sulfur Polymer Cement Concrete and Other Chemical-Resistant Polymer Concretes

C1371-04 .....Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers

C1549-04 .....Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer

D146-04 .....Standard Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing

D312-00(R2006) .....Standard Specification for Asphalt Used in Roofing

D1644-01(R2006) .....Standard Test Methods for Nonvolatile Content of Varnishes

D2523-00(R2006) .....Standard Practice for Testing Load-Strain Properties of Roofing Membranes

D2823-05 .....Standard Specification for Asphalt Roof Coatings, Asbestos Containing

D3960-05 .....Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings

D4073-06 .....Standard Test Method for Tensile-Tear Strength of Bituminuous Roofing Membranes

D4263-83(R2005) .....Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

D4586-07 .....Asphalt Roof Cement, Asbestos Free

D4601-04 .....Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing

D4897-01 .....Asphalt Coated Glass Fiber Venting Base Sheet Used in Roofing

D5147-07 .....Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material

D5201-05(R2010) .....Standard Practice for Calculating Formulation Physical Constants of Paints and Coatings

D6162-00(R2008) .....Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements

D6163-00(R2008) .....Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements

D6164-05 .....Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements

D6511-06 .....Standard Test Methods for Solvent Bearing Bituminous Compounds

E108-10 .....Standard Test Methods for Fire Tests of Roof Coverings

E408-71(R2008) .....Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques

E1918-06 .....Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field

E1980-01 .....Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field

WK29032-10 .....Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer

F. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)

ASHRAE 90.1-2007 .....Energy Standard for Buildings Except Low-Rise Residential Buildings, Appendix f.

G. FM Approvals: RoofNav Approved Roofing Assemblies and Products.

4450-89 .....Approved Standard for Class 1 Insulated Steel Deck Roofs

4470-10 .....Approved Standard for Class 1 Roof Coverings

1-28-09 .....Loss Prevention Data Sheet: Design Wind Loads.

1-29-09 .....Loss Prevention Data Sheet: Above-Deck Roof Components

1-49-09 .....Loss Prevention Data Sheet: Perimeter Flashing

H. National Roofing Contractors Association: Roofing and Waterproofing Manual

I. U.S. Environmental Protection Agency (EPA):
EPA 600/R13/116-02 .....Method for the Determination of Asbestos in Bulk Building Materials

J. U.S. Department of Agriculture (USDA): USDA BioPreferred Catalog, www.biopreferred.gov

K. U.S. Department of Energy (DoE): Roof Products Qualified Product List, www.energystar.gov

1.4 PERFORMANCE REQUIREMENTS

A. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

B. Roofing Membrane System Load-Strain Properties: Provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following properties at membrane failure when tested according to ASTM D6164, Type 1, Grade S:

1. Tensile strength (peak load) at failure, at 0 deg F: 70lbf/in in the machine direction, minimum; 20% elongation at break.
2. Tensile strength (peak load) at failure, at 75 deg F: 50lbf/in in the machine direction, minimum; 35% elongation at break.
3. Dimensional stability: 1% maximum
4. Low temperature flexibility: 0 deg F, max.

C. Roofing System Energy Performance Requirements: Provide a roofing system identical to components that that have been successfully tested by a qualified independent testing and inspecting agency to meet the following requirements:

1. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E1980 based on testing identical products by a qualified testing agency.
4. Energy Performance, Aged: Provide roofing system with minimum three-year aged solar reflectance not less than 0.55 when tested in accordance with ASTM C1549 or ASTM E1918, and in addition, a minimum three-year-aged thermal emittance of 0.75 when tested in accordance with ASTM C1371 or ASTM E408.
   a. Where tested aged values are not available for proposed product, submit calculations to adjust initial solar reflectance to demonstrate compliance as indicated in ASHRAE 90.1-2007 Addendum f.
   b. Alternatively, provide roofing system with minimum three-year aged Solar Reflectance Index of not less than 64 when determined in accordance with

the Solar Reflectance Index method in ASTM E1980 using a convection coefficient of 2.1 BTU/h-ft2 (12 W/m2K).

D. Wind Uplift Requirements:

1. Wind uplift pressures for the roof system components at the field, perimeter and corner conditions: As shown.
2. Wind uplift rating design requirements: Design roof system components for wind uplift ratings (FM Ratings) at the field, perimeter and corner conditions: As shown.

1.5 QUALITY ASSURANCE:

A. Installer Qualification Requirements:

1. Installation contractor shall be licensed certified of approved, in writing, by the manufacturer to perform work under the warranty requirements of this Section.
2. Installation contractor shall demonstrate that it has successfully installed a minimum of three (3) new or re-roofing projects of similar size using a torch-applied, multiply-ply, modified bituminous roofing membrane system within the last 3 years; including a minimum of one (1) Protected Roof Membrane Assembly (PRMA). Contractor shall provide reference information including: Names of projects, descriptions of projects, dollar amounts, locations, contract start dates, contract end dates, contract performance periods, user/agency POCs and current phone numbers and email addresses). References shall be contacted for confirmation by COR.
3. Contractor shall employ a minimum of one (1) on-site superintendent/foreman that will be assigned full-time to the project and have oversight of all project conditions. This individual shall be knowledgeable and experienced in roofing of similar types and scopes, and able to communicate with owner and workers. The contractor shall provide proof that this individual has performed a minimum of five (5) similar sized torch-applied, modified bituminous projects in the last five (5) years; including a minimum of one (1) PRMA project during that time period. Contractor shall include similar project information as outlined in section 1.5.A.2, above
4. Provide adequate number of experienced workers regularly engaged in this type of work who are skilled in the application techniques of the materials specified.

B. Product/Material Requirements:

1. Obtain products from single manufacturer or from sources recommended by manufacturer for use with roofing membrane system and incorporated in manufacturer's warranty.
   a. Bituminous Coatings and Mastics: 500 g/l (4.2 lb/gal.).
   b. Roof Coatings: 250 g/l (2.1 lb/gal.).

C. Roofing system design standard requirements:
1. Recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to modified bituminous sheet roofing for storage, handling and application.
2. Recommendations of FM Approvals 1-49 Loss Prevention Data Sheet for Perimeter Flashings.
3. Recommendations of ANSI/SPRI ES-1 for roof edge design.
4. Recommendations of ANSI/SPRI RP4 for ballasted roof systems.
5. Roofing System Design: Provide roofing system that is identical to systems successfully tested by a qualified testing and inspecting agency to provide a minimum wind uplift resistance ratings of FM 1-90 (for the roof field; perimeter and corner enhancements shall be provided, as required).
6. FM Approvals Listing: Provide roofing membrane, base flashing, and component materials that comply with the requirements in FM Approval Standards 4450 and 4470 as part of a roofing system and that is listed in FM Approval’s "RoofNav" for fire, wind and hail classifications or ratings, as shown.

D. Pre-Installation Roof Meeting:
1. Prior to demolition of the existing roofing system and prior to any roofing application, hold a pre-roofing meeting arranged by the Contractor and attended by the Roofing Inspector, Material Manufacturers Technical Representative, Roofing Applicator, Contractor, and Contracting officer representative.
2. Discuss specific expectations and responsibilities, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.
3. Inspect roof deck at this time to:
   a. Verify that work of other trades which penetrates roof deck is completed.
   b. Determine adequacy of deck anchorage, presence of foreign material, moisture and unlevel surfaces, or other conditions that would prevent application of roofing system from commencing or cause a roof failure.
   c. Examine samples and installation instructions of manufacturer.

1.6 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, SAMPLES.

B. Product Data:

1. Asphalt and adhesive materials.
2. Modified bituminous sheet roofing and flashing membrane materials.
3. Roofing cement.
4. Roof walkway.
5. Fastening requirements.
6. Application instructions.
7. Roof expansion joint systems.
8. All accessories

C. Samples:

1. Nails and fasteners, each type.

D. Shop Drawings: Include plans, sections, details, and attachments.

1. Base flashings and terminations.

E. Certificates:

1. Indicating materials and method of application of roofing system meets requirements of FM Approvals "RoofNav" for specified fire/windstorm classification.
2. Indicating compliance with load properties requirement.
3. Indicating compliance with energy performance requirement.

F. Warranty:

1. Sample Manufacturer’s Warranty document (see section 1.9, below)
2. Sample Contractor’s Guarantee document (see section 1.9, below)

G. Documentation of supervisors' and inspectors' qualifications.

H. Field reports of roofing inspector.

I. Temporary protection plan. Include list of proposed temporary materials.

J. Contract Close-out Submittals:

1. Maintenance Manuals.
2. Warranty signed by installer and manufacturer.

1.7 DELIVERY, STORAGE AND MARKING:

A. Comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to built-up roofing for storage, handling and installation.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Environmental Controls: Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

C. Protection of interior spaces: Refer to Section 01 00 00, GENERAL REQUIREMENTS.

1.9 WARRANTY:

A. Roofing work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend warranty period to 20 years - No Dollar Limit (NDL) from acceptance of facility by the Government.

B. General: Warranties shall be issued as "Total Performance Warranties" and shall cover all components of the waterproofing installation, and typically include the waterproofing membranes, flashings, insulation, cover board, pavers and paver anchorage when they are supplied by the manufacturer and installed in accordance with the manufacturer's General Requirements. All components of the waterproofing installation that are to be covered under the terms of the warranty should be expressly itemized in the Warranty or Warranty Rider.

1. Membrane: The waterproofing membranes warranted against leaks for a period of twenty 20 years.

2. Insulation: The insulation is to retain 80% of its original thermal value for a period of twenty 20 years.

3. Pavers: The pavers will not crack, split, spall or disintegrate as a result of freeze- thaw cycling for a period of ten 15 years.

4. Warranty shall not exclude and will specifically include removing and replacing overburdens on PRMA systems as necessary to effect warranty repairs.

C. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1. Warranty: 20 years (NDL; No Dollar Limit) Warranty that shall commence on the Date of Substantial Completion for the project.

2. Warranty: Before final payment, furnish to Owner a written *manufacturer's single-source, total performance warranty* including but not limited to new

roofing membrane, flashing roof system assembly components and other components of roofing system to be watertight for a period of 20 years from date of final acceptance, agreeing to make repairs necessary to ensure a watertight roof during entire 20 year guarantee period, and agreeing to repair or replace roofing components damaged by winds with gust speeds of 120 mph velocity or less. Also, that composite paver panels and any extruded polystyrene foam under that product will retain at least 80% of its thermal resistance and that concrete topping on extruded polystyrene foam will remain attached to foam.

3. Roof Areas:

   1. Roof Areas 6A, 6B, 6C, 6D – The manufacturer's single-source, total performance warranty shall cover all roof system components that form the roof assembly from the top surface of the concrete deck to the top surface of the composite paver panel system, including, but not limited to all roofing membrane and flashing systems, drainage mat, insulation, composite insulation and all anchorage systems at the deck level and at the surface.

   2. Roof Areas 7A, 7B and 6-Gutter - The manufacturer's single-source, total performance warranty shall cover all roof system components that form the roof assembly from the top surface of the metal or concrete deck to the top surface of the roof membrane, including, but not limited to all roofing membrane and flashing systems, all forms of insulation, cover board and all anchorage systems at the deck level and the surface.

D. Contractor's Guarantee: The contractor shall furnish a two (2) year guarantee to the Owner for all roof assembly, flashing, insulation, cover board, pavers, sheet metal, railings, and all other roof components that make up the complete waterproof, wind resistance roof assembly. This guarantee shall cover all labor, materials, workmanship and all related work installed by this contractor (including, but not limited to, all membrane components, flashing, insulation, sheet metal, pavers, etc.)

1. Guarantee: 2 years (NDL; No Dollar Limit) Guarantee that shall commencing on Date of Substantial Completion of the project.
2. Guarantee: Before final payment, furnish to Owner a written contractor's, guarantee including but not limited to roofing, flashings, insulation, sheet metal, and all other components of the roofing system against workmanship and water-tightness for a period of 2 years from date of final acceptance,
3. Roof Areas: 6A, 6B, 6C, 6D, 7A, 7B and 6-Gutter.

PART 2 - PRODUCTS

2.1 ADHESIVE AND ASPHALT MATERIALS:

A. General: Adhesive and sealant materials recommended by roofing system manufacturer for intended use, identical to materials utilized in approved listed roofing system, and compatible with roofing membrane.

2.2 MEMBRANE AND SHEET MATERIALS:

A. Membrane Materials, General: Provide combination of base, ply, and cap sheet materials that have been tested in combination and comply with load properties performance requirement of this Section.

B. Primer: ASTM D41; A blend of elastomeric bitumen, volatile solvents and adhesive enhancing additives used to prime concrete or metal substrates to enhance the adhesion of torch-applied polymer modified bituminous roofing membrane. Approved by the manufacturer.

C. Vapor Retarder/Temporary Roof Membrane (PRMA; Concrete Deck Only): ASTM 6164, Type 1, Grade S, minimum 120 mils thick membrane sheet ply with a non-woven polyester reinforcement and of thermo-fusible elastomeric asphalt. Both sides shall be protected by a thermo-fusible plastic film. Additional features include the following.

1. Reinforcement: non-woven polyester, 180g/m2, minimum.
2. Thermo-fusible elastomeric asphalt: mix of selected bitumen and SBS thermoplastic polymer
3. Smooth surface
4. Membrane is installed using torch-application techniques.

D. Base Sheet: ASTM 6164, Type 1, Grade S, minimum 120 mils thick membrane sheet ply with a non-woven polyester reinforcement and of thermo-fusible elastomeric asphalt. Both sides shall be protected by a thermo-fusible plastic film. Additional features include the following.

1. Reinforcement: non-woven polyester, 180g/m2, minimum.
2. Thermo-fusible elastomeric asphalt: mix of selected bitumen and SBS thermoplastic polymer
3. Smooth surface
4. Membrane is installed using torch-application techniques.

E. Membrane Cap Sheet (PRMA; Concrete Deck Only): ASTM 6164, Type 1, Grade S, minimum 120 mils thick membrane sheet ply with a non-woven polyester reinforcement and of thermo-fusible elastomeric asphalt. Both sides shall be protected by a thermo-fusible plastic film. Additional features include.

1. Reinforcement: non-woven polyester, 180g/m2, minimum.

2. Thermo-fusible elastomeric asphalt: mix of selected bitumen and SBS thermoplastic polymer
3. High-brush, sanded surface
4. Membrane is installed using torch-application techniques.

F. Membrane Cap Sheet(Steel Deck Only): ASTM 6164, Type 1, Grade G, minimum 160 mils thick membrane sheet ply with a non-woven polyester reinforcement and of thermo-fusible elastomeric asphalt. Both sides shall be protected by a thermo-fusible plastic film. Additional features include.

1. Exterior Fire-Test Exposure, ASTM E108: Class A
2. Reinforcement: non-woven polyester, 180g/m2, minimum.
3. Thermo-fusible elastomeric asphalt: mix of selected bitumen and SBS thermoplastic polymer
4. Colored Granule topside surface; Granule Color: White
5. Membrane is installed using torch-application techniques.
6. Solar Reflectance Index (SRI), ASTM E1980: 85

G. Base Flashing Backer Sheet: ASTM D4601, Type 1, self-adhered, asphalt-impregnated and coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

H. Base Flashing Cap Sheet: ASTM D6164, Grade G, Type 1, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; Granule Color: White.

I. Flashing Membrane (HVAC Curbs and Irregular Penetrations)

1. Reinforced, Fluid Applied Flashing Membrane:
   a. Type 1 - Description: One-component polyurethane / bitumen waterproofing resin used with polyester reinforcement and manufactured by the roofing membrane manufacturer and compliant with all performance requirements.
   b. Type 2 – Description: Vertical grade resin material, two-component, cold fluid applied reinforced (PMMA) membrane with needle punched non-woven polyester reinforcing fleece and required product accessories.

J. Termination Bars - Fastening bars used to secure membrane at vertical terminations shall be a 1" x 1/4” continuous flat aluminum bar, pre-drilled at 12" o/c on-center as approved by roofing system system manufacturer.

2.3 EXPANSION JOINT COVERS

A. Description: Waterproofing membrane manufactured by combining a polyester fabric with SBS modified bitumen and a root-repelling agent. The under-face is covered with a thermo fusible plastic film. The top face has an aluminum foil

adhered to the centre of the membrane that serves as a bond breaker and is covered by a protective silicone paper to be removed during application. Nominal thickness is 0.16 inches and width of 18 inches.

B. Components: Polyester fabric, thermofusible elastomeric bitumen, silicone paper, and aluminum sheathing (width = 0.20 m.).

C. Properties:

1. Strength at 10% elongation:	5 N/cm
2. Strength at rupture:	250 N/cm
3. Elongation at rupture:	120%
4. Elongation at rupture at -20^0C:	100%
5. Low temperature flexibility:	-30^0C
6. Elasticity limit:	40%
7. Fatigue resistance:	1000 cycles.

2.4 FASTENERS:

A. Roofing Fasteners: Factory-coated steel fasteners and metal or plastic plates, where applicable, meeting requirements of FM Approvals 4470, tested by fastener manufacturer for required pullout strength, and recommended by roofing manufacturer for application.

B. Accessory Fasteners: Corrosion-resistant fasteners compatible with adjacent materials and recommended for application by manufacturer of component to be fastened.

2.5 ROOF WALK PADS:

A. Prefabricated asphalt plank consisting of a homogeneous core of asphalt, plasticizers and inert fillers, bonded by heat and pressure between two saturated and coated sheets of felt:

1. Top side of plank surfaced with ceramic granules. Granule Color: White.
2. Size: Minimum 1/2-inch thick, manufacturer’s standard size, but not less than 12 inches in least dimension and 24 inches in length or as recommended by the manufacturer.
3. Surfacing of the walk pads shall match the surfacing of the field membrane.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine substrates and conditions with roofing Installer and roofing inspector to verify compliance with project requirements and suitability to accept

subsequent roofing work. Correct unsatisfactory conditions before proceeding with roofing work.

B. Do not apply roofing if roof surface will be used for subsequent work platform, storage of materials, or staging or scaffolding will be erected thereon unless system is protected.

3.2 PREPARATION

A. Complete roof deck inspection and repairs prior to commencing roofing work:
   1. Install blocking, edge strips, nailers, cants, and other components where insulation, roofing, and base flashing is attached to, in place ready to receive insulation and roofing.
   2. Complete deck and insulation to provide designed drainage to working roof drains.
   3. Document installation of related materials to be concealed prior to installing roofing work.

B. Dry out surfaces, including the flutes of metal deck that become wet from any cause during progress of the work before roofing work is resumed. Apply materials to dry substrates.

C. Sweep decks to broom clean condition. Remove all dust, dirt or debris.

D. Remove projections that might damage materials.

E. Concrete Decks:
   1. Test concrete decks for moisture prior to application of roofing materials. Test for capillary moisture by plastic sheet method according to ASTM D4263.
   2. Prime concrete decks, including precast units, with primer as specified. Keep primer back four inches from joints in precast units.
   3 Allow primer to dry before torch application of roof membrane base sheet.

3.4 TEMPORARY PROTECTION

A. Install temporary protection at the end of day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent. Comply with approved temporary protection plan.

B. Install temporary cap flashing over the top of base flashings where permanent flashings are not in place to provide protection against moisture entering the roof system through or behind the base flashing. Securely anchor in place to prevent blow off and damage by construction activities.
   1. Glaze coat exposed surfaces of felts to seal within the bitumen coating. Do not leave felt surfaces or edges exposed.

C. Provide for removal of water or drainage of water away from the work.

D. Provide temporary protection over installed roofing by means of duckboard walkways, plywood platforms, or other materials, as approved by Contracting officer representative, for roof areas that are to remain intact, and that are subject to foot traffic and damage. Provide notches in sleepers to permit free drainage.

3.5 INSTALLATION, GENERAL

A. FM Approvals Installation Standard: Install roofing membrane, base flashings, wood cants, blocking, curbs, and nailers, and component materials in compliance with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system as listed in FM Approval's "RoofNav" for fire/windstorm classification indicated. Comply with recommendations in FM Approvals' Loss Prevention Data Sheet 1-49, including requirements for wood nailers and cants.

B. NRCA Installation Standard: Install roofing system in accordance with applicable NRCA Manual Plates and NRCA recommendations, including ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing"

C. Manufacturer Recommendations: Comply with roofing system manufacturer's written installation recommendations.

D. Coordination with related work: Coordinate roof operations with roof insulation and sheet metal work so that insulation and flashings are installed concurrently to permit continuous roofing operations.

E. Installation Conditions:

1. Apply dry roofing materials. Apply roofing work over dry substrates and materials.
2. Apply materials within temperature range and surface and ambient conditions recommended by manufacturer.
3. Except for temporary protection, do not apply materials during damp or rainy weather, during excessive wind conditions, nor while moisture (dew, snow, ice, fog or frost) is present in any amount in or on the materials to be covered or installed:
   a. Do not apply materials when the temperature is below 40 deg. F.
   b. Do not apply materials to substrate having temperature of 40 deg. F or less.

3.6 INSTALLATION OF MODIFIED BITUMEN MEMBRANE:

A. Primer: Apply primer to substrates where recommended by roofing manufacturer, in application quantities recommended by roofing manufacturer.

B. Membrane Sheets:

1. Number of Plies: 2, minimum, including base sheet and cap sheet, and additional plies as required to meet load/strain properties specified in Part 1 of this Section.
2. Commence the laying of sheets at the low points.
3. Roll sheets into hot roofing asphalt brushing down to firmly embed, free of wrinkles, fish mouths, blisters, bubbles, voids, air pockets or other defects that prevent complete adhesion:
4. Cut to fit closely around pipes, roof drains, bitumen stops, and similar roof projections.
5. Lap sheets shingle fashion starting with starter strips at right angles to slope of roof.
6. Laps for Top Sheet and Base Sheet:
   a. Base sheet, lapped three inches.
   b. Use 18 inch starting widths, lap top sheet 19 inches.
   c. Lap end joints of sheet six inches. Stagger end joints in relation to end joints in adjacent and proceeding plies.

E. Roof edges and terminations:
1. Where nailers occur at roof edges under gravel stops or penetrations to receive metal base flashing, apply a continuous strip of underlayment over the nailers before the first ply sheet is applied. Strip shall be installed on top of venting base sheet if any.
2. After membrane is installed, turn the underlayment back over the roofing, and secure in place with hot roofing asphalt before gravel stops or other metal flanges extending out onto the membrane are installed.
3. Where cants occur at vertical surfaces, cut off roofing sheets two inches above top of cant strips, except at prefabricated curbs, scuttles and other roof accessories having integral cants, extend membrane over cant and up vertical surface to top of curb or nailer as shown.
4. Where fascia-cant occurs at roof edges, extend membrane beyond outside cant face and cut off at outside after base flashing is installed.
5. Where reglet occurs at vertical surfaces, extend plies roofing sheets up into reglet the full depth of the reglet.

3.7 BASE FLASHING:

A. Provide built-up base flashing over cants and as necessary to make work watertight.

B. Prime vertical surfaces of masonry and concrete with asphalt primer except where vented base sheet is required to provide edge venting.

C. Apply flashing on top of roofing, up face of cant and up the face of the vertical surface, at least eight inches above the roofing but not more than 14 inches above the roofing, generally full height beneath counter flashing or top of curb flashing.
   1. At fascia-cants, extend to top of cant and cut off at top of cant.
   2. At reglet, extend full depth into the reglet.
   3. Where venting base sheet is used with insulating concrete, do not seal edges of venting base sheet with bitumen; allow for venting.
D. Use two plies of modified bituminous sheet.
   1. Extend the first ply four inches out on the roofing, and the second ply three inches beyond the first ply. Lap ends three inches with joints broken 18 inches in each ply. Use smooth surface modified bituminous sheet for first ply.
   2. Use granular surfaced modified bitumen cap sheet.
E. Set base flashing either in Type III or IV asphalt.
   1. Embed each sheet in asphalt so sheets do not touch.
   2. Set cap sheet in cold-applied adhesive with laps sealed with cold-applied adhesive.
   3. Except for venting roof edges, seal the top edge of the base flashing with roof cement.
F. Except at metal fascia cants, secure top edge of base flashing with nails on a line approximately one inch below top edge, spaced not more than eight inches on center.
   1. Cover nail heads with roof cement.
   2. Cover the top of the base flashing with counterflashing as specified in Section 07 60 00, FLASHING AND SHEET METAL. At the fascia cants secure the top edge of the flashing with fascia compression clamp as specified in Section 07 60 00, FLASHING AND SHEET METAL.

3.8 STRIPPING PLIES:

A. Coordinate to set flanges of metal flashing in roof cement on top sheet of the modified bituminous roofing and mailing to blocking with Section 07 60 00, FLASHING AND SHEET METAL.
B. Cover that portion of the horizontal flanges of metal base flashings, gravel stops, and other flanges extending out onto the roofing with modified bituminous sheet.
C. Extend the sheet out on the roofing six (6) inches beyond the edge of the metal flange. Cut edge to fit tight against vertical members of flange.

D. Prime flange before stripping, embed sheet in cold-applied adhesive.

3.9 ROOF WALKWAYS (STEEL DECK ROOFS ONLY)

A. Install roof walkways where indicated.

3.10 FIELD QUALITY CONTROL:

A. Roofing Inspector: Owner will engage the services of a Registered Roof Observer (RRO) to perform quality assurance observations, as required.

B. Inspection: An authorized representative of the manufacturer who is to furnish the single source roof warranty shall inspect roofing work in progress and at final completion prior to issuance of roofing warranty.

1. Two (2) general inspections will be required for each of the roof levels (Floor 6 and Floor 7), by the manufacturing company offering the single source warranty, an inspection of each of the roof areas' membrane systems after they are completed, and prior to the installation of the PRMA composite paver panels. A final inspection will also be required upon completion of each roof area installation (i.e., Roof Areas 6A, 6B, 6C, 7A, 7B and 6G). The Contactor shall contact the technical department of the manufacturer to find out who to contact when ready for those inspections and shall schedule such site visits and coordinate these site visits to take place in the presence of the COR, the Architect and the roofing consultant.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

1. Notify the COR and Architect a minimum of 48 hours in advance of date and time of inspection.

D. Repair or remove and replace components of roofing work where test results or inspections indicate that they do not comply with specified requirements.

1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.11 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of acceptance by Owner.

C. Clean overspray and spillage from adjacent construction. Clean membrane and restore surface to like-new condition meeting solar reflectance requirements.

- - - E N D - - -

SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

Formed sheet metal work for wall and roof flashing, copings, roof edge metal, fascia, drainage specialties, and formed expansion joint covers are specified in this section.

1.2 RELATED WORK

A. Manufactured flashing, copings, roof edge metal, and fasciae: Section 07 71 00 ROOF SPECIALTIES.

B. Flashing components of factory finished roofing and wall systems: Division 07 roofing and wall system sections.

C. Joint Sealants: Section 07 92 00, JOINT SEALANTS.

D. Integral flashing components of manufactured roof specialties and accessories or equipment: Section 07 71 00, ROOF SPECIALTIES, Section 07 72 00, ROOF ACCESSORIES, Division 22, PLUMBING sections and Division 23 HVAC sections.

E. 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

C. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):

ANSI/SPRI ES-1-03.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

D. 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

E. ASTM International (ASTM):

A240/A240M-14.....Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.

A653/A653M-11.....Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated (Galvanized) by the Hot- Dip Process

B32-08.....Solder Metal

B209-10.....Aluminum and Aluminum-Alloy Sheet and Plate

B370-12.....Copper Sheet and Strip for Building Construction

D173-03(R2011).....Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing

D412-06(R2013).....Vulcanized Rubber and Thermoplastic Elastomers-Tension

D1187-97(R2011).....Asphalt Base Emulsions for Use as Protective Coatings for Metal

D1784-11.....Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns

D4586-07.....Asphalt Roof Cement, Asbestos Free

F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.

G. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual

H. Federal Specification (Fed. Spec):

A-A-1925A.....Shield, Expansion; (Nail Anchors)

UU-B-790A.....Building Paper, Vegetable Fiber

I. International Code Commission (ICC): International Building Code, Current Edition

1.4 PERFORMANCE REQUIREMENTS

A. Wind Uplift Forces: Resist the following forces per FM Approvals 1-49:

1. Wind Zone 1: 0.48 to 0.96 kPa (10 to 20 lbf/sq. ft.): 1.92-kPa (40-lbf/sq. ft.) perimeter uplift force, 2.87-kPa (60-lbf/sq. ft.) corner uplift force, and 0.96-kPa (20-lbf/sq. ft.) outward force.
2. Wind Zone 1: 1.00 to 1.44 kPa (21 to 30 lbf/sq. ft.): 2.87-kPa (60-lbf/sq. ft.) perimeter uplift force, 4.31-kPa (90-lbf/sq. ft.) corner uplift force, and 1.44-kPa (30-lbf/sq. ft.) outward force.
3. Wind Zone 2: 1.48 to 2.15 kPa (31 to 45 lbf/sq. ft.): 4.31-kPa (90-lbf/sq. ft.) perimeter uplift force, 5.74-kPa (120-lbf/sq. ft.) corner uplift force, and 2.15-kPa (45-lbf/sq. ft.) outward force.
4. Wind Zone 3: 2.20 to 4.98 kPa (46 to 104 lbf/sq. ft.): 9.96-kPa (208-lbf/sq. ft.) perimeter uplift force, 14.94-kPa (312-lbf/sq. ft.) corner uplift force, and 4.98-kPa (104-lbf/sq. ft.) outward force.

B. Wind Design Standard: Fabricate and install copings/roof-edge flashings tested per ANSI/SPRI ES-1 to resist design pressure indicated on Drawings.

1.5 SUBMITTALS

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

B. Shop Drawings: For all specified items, including:

1. Flashings
2. Copings
3. Gravel Stop-Fascia
4. Gutter and Conductors
5. Expansion joints
6. Fascia-cant

C. Manufacturer's Literature and Data: For all specified items, including:

1. Two-piece counterflashing

2. Thru wall flashing
3. Expansion joint cover, each type
4. Nonreinforced, elastomeric sheeting
5. stainless steel
6. Polyethylene coated copper
7. Bituminous coated copper
8. Copper covered paper
9. Fascia-cant

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 A240, Type 302B, dead soft temper.

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 m^2(6 lbs/100 sf).

C. Bituminous Paint: ASTM D1187, Type I.

D. Fasteners:

1. Use copper, copper alloy, bronze, brass, or stainless steel for copper and copper clad stainless steel, and stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
2. Nails:
   a. Minimum diameter for copper nails: 3 mm (0.109 inch).
   b. Minimum diameter for aluminum nails 3 mm (0.105 inch).
   c. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
   d. 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. Insect Screening: ASTM D3656, 18 by 18 regular mesh.

G. 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. Copper: 30g (10 oz) minimum 0.33 mm (0.013 inch thick).
2. Stainless steel: 0.25 mm (0.010 inch) thick.
3. Copper clad stainless steel: 0.25 mm (0.010 inch) thick.
4. Galvanized steel: 0.5 mm (0.021 inch) thick.

C. Exposed Locations:

1. Copper: 0.4 Kg (16 oz).
2. Stainless steel: 0.4 mm (0.015 inch).
3. Copper clad 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, copper, stainless steel and copper clad stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
2. Jointing of copper over 0.5 Kg (20 oz) weight or 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. Edges of bituminous coated copper, copper covered paper, non-reinforced elastomeric sheeting and polyethylene coated copper shall be jointed by lapping not less than 100 mm (4 inches) in the direction of flow and cementing with asphalt roof cement or sealant as required by the manufacturer's printed instructions.

6. Soldering:
   a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of uncoated copper, stainless steel, and copper clad stainless steel.
   b. Wire brush to produce a bright surface before soldering lead coated copper.
   c. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
   d. Completely remove acid and flux after soldering is completed.

B. Expansion and Contraction Joints:
   1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
   2. Space joints as shown or as specified.
   3. Space expansion and contraction joints for copper, stainless steel, and copper clad 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.
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 Strips for fascia anchorage to extend below the supporting wood construction to form a drip and to allow the flashing to be hooked over the lower edge at least 19 mm (3/4-inch).
6. 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.

E. Drips:

1. Form drips at lower edge of sheet metal counter-flashings (cap flashings), fascias, gravel stops, wall copings, 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.
3. All metal roof edges shall meet requirements of IBC, current edition.

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.

3. Where copper gravel stops, copings and flashings will carry water onto cast stone, stone, or architectural concrete, or stainless steel.

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. Copper: Mill finish.
2. Stainless Steel: Finish No. 2B or 2D.
3. Aluminum:
   a. Clear Finish: AA-C22A41 medium matte, clear anodic coating, Class 1 Architectural, 18 mm (0.7 mils) thick.
   b. Colored Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating, Class 1 Architectural, 18 mm (0.7 mils) thick. Dyes will not be accepted.
   c. Fluorocarbon Finish: AAMA 620, high performance organic coating.
   d. Mill finish.
4. 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. Either copper, stainless steel, or copper clad 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. For Masonry Work When Exposed Edge Forms a Receiver for Counter Flashing:
1. Use same metal and thickness as counter flashing.
2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
3. Form exposed portion as snap lock receiver for counter flashing upper edge.

D. For Flashing at Architectural Precast Concrete Panels or Stone Panels.
1. Use plan flat sheet of stainless steel.
2. Form exposed portions with drip as specified or receiver.

E. Window Sill Flashing and Lintel Flashing:
1. Use either copper, stainless steel, copper clad stainless steel plane flat sheet, or nonreinforced elastomeric sheeting, bituminous coated copper, copper covered paper, or polyethylene coated copper.
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.

F. Door Sill Flashing:
1. Where concealed, use either 0.5 Kg (20 oz) copper, 0.5 mm (0.018 inch) thick stainless steel, or 0.5 mm (0.018 inch) thick copper clad stainless steel.
2. Where shown on drawings as combined counter flashing under threshold, sill plate, door sill, or where subject to foot traffic, use either 0.6 Kg (24 ounce) copper, 0.6 mm (0.024 inch) stainless steel, or 0.6 mm (0.024 inch) thick stainless steel.
3. Fabricate flashing at ends to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening with folded corners.

2.7 BASE FLASHING

A. Use metal base flashing at vertical surfaces intersecting built-up roofing without cant strips or where shown.
   1. Use either copper, or stainless steel, thickness specified unless specified otherwise.
   2. When flashing is over 250 mm (10 inches) in vertical height or horizontal width use either 0.5 Kg (20 oz) copper or 0.5 mm (0.018 inch) stainless steel.
   3. Use stainless steel at aluminum roof curbs where flashing contacts the aluminum.
   4. Use either copper, or stainless steel at pipe flashings.
B. Fabricate metal base flashing up vertical surfaces not less than 200 mm (8 inch) nor more than 400 mm (16 inch).
C. Fabricate roof flange not less than 100 mm (4 inches) wide unless shown otherwise. When base flashing length exceeds 2400 mm (8 feet) form flange edge with 13 mm (1/2 inch) hem to receive cleats.
D. Form base flashing bent from strip except pipe flashing. Fabricate ends for riveted soldered lap seam joints. Fabricate expansion joint ends as specified.
E. Pipe Flashing: (Other than engine exhaust or flue stack)
   1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
   2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
   3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
      a. Form top of sleeve to turn down into the pipe at least 25 mm (one inch).
      b. Allow for loose fit around and into the pipe.
   4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
      a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
      b. Allow for loose fit around pipe.

2.8 COUNTERFLASHING (CAP FLASHING OR HOODS)

A. Either copper or stainless steel, unless specified otherwise.
B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip:

1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
3. Two-piece, lock in type flashing may be used in-lieu-of one piece counter-flashing.
4. Manufactured assemblies may be used.
5. Where counterflashing is installed at new work use an integral flange at the top designed to be extended into the masonry joint or reglet in concrete.
6. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.

C. One-piece Counterflashing:
1. Back edge turned up and fabricate to lock into reglet in concrete.
2. Upper edge formed to extend full depth of masonry unit in mortar joint with back edge turned up 6 mm (1/4 inch).

D. Two-Piece Counterflashing:
1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 6 mm (1/4 inch) and exposed edge designed to receive and lock counterflashing upper edge when inserted.
2. Counterflashing upper edge designed to snap lock into receiver.

E. Surface Mounted Counterflashing; one or two piece:
1. Use at existing or new surfaces where flashing can not be inserted in vertical surface.
2. One piece fabricate upper edge folded double for 65 mm (2 1/2 inches) with top 19 mm (3/4 inch) bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 400 mm (16 inch) centers between end holes. Option: One piece surface mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
3. Two pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 400 mm (16 inch) centers between upper and lower edge.

F. Pipe Counterflashing:

1. Form flashing for water-tight umbrella with upper portion against pipe to receive a draw band and upper edge to form a "V" joint sealant receiver approximately 19 mm (3/4 inch) deep.
2. Fabricate 100 mm (4 inch) over lap at end.
3. Fabricate draw band of same metal as counter flashing. Use 0.6 Kg (24 oz) copper or 0.33 mm (0.013 inch) thick stainless steel or copper coated stainless steel.
4. Use stainless steel bolt on draw band tightening assembly.
5. Vent pipe counter flashing may be fabricated to omit draw band and turn down 25 mm (one inch) inside vent pipe.

G. Where vented edge decks intersect vertical surfaces, form in one piece, shape to slope down to a point level with and in front of edge-set notched plank; then, down vertically, overlapping base flashing.

2.9 GRAVEL STOPS

A. General:
1. Fabricate in lengths not less than 2400 mm (8 feet) long and maximum of 3000 mm (10 feet).
2. Fabricate internal and external corners as one-piece with legs not less than 600 mm (2 feet) or more than 1200 mm (4 feet) long.
3. Fabricate roof flange not less than 100 mm (4 inches) wide.
4. Fabricate top edge to extend above roof not less than 25 mm (one inch) for embedded gravel aggregate and not less than 100 mm (4 inches) for loose laid ballast.
5. Fabricate lower edge outward at an angle of 45 degrees to form drip and as fascia or as counter flashing as shown:
   a. Fabricate of one-piece material of suitable width for fascia height of 250 mm (10 inch) maximum or counterflashing lap of not less than 100 mm (4 inch) over base flashing.
   b. Fabricate bottom edge of formed fascia to receive edge strip.
   c. When fascia bottom edge forms counter flashing over roofing lap roofing not less than 150 mm (6 inches).

B. Formed Flat Sheet Metal Gravel Stops and Fascia:
1. Fabricate as shown of .05 mm (0.018 inch) thick stainless steel.
2. When fascia exceeds 150 mm (6 inches) in depth, form one or more horizontal stops not less than 13 mm (1/2 inch) high in the fascia.
3. Fabricate as two-piece fascia when fascia depth exceeds 250 mm (10 inches).

4. At joint between ends of sheets, provide a concealed clip soldered or welded near one end of each sheet to hold the adjoining sheet in lapped position. The clip shall be approximately 100 mm (4 inches) wide and shall be the full depth of the fascia less 25 mm (one inch) at top and bottom. Clip shall be of the same thickness as the fascia.
5. Provide edge strip as specified with lower hooked edge bent outward at an angle of 45 degrees.

C. Formed (Corrugated Sheet) Sheet Metal Gravel Stops and Fascia:
1. Fabricate as shown of 0.4 mm (0.015 inch) thick stainless steel.
2. Sheets shall have 2 mm (1/16 inch) deep corrugations either transversely or diagonally rolled into the sheet. Crimped sheets are not acceptable.
3. Factory fabricate prepackaged system, complete with fastenings.
4. Provide concealed flashing splice plate at joints not less than 150 mm (6 inches) long and continuous edge strip at lower edge of fascia made from same metal.
5. Fabricate as two-piece fascia when fascia depth exceeds 175 mm (7 inches).

2.10 BITUMEN STOPS

A. Fabricate bitumen stops for bituminous roofing edges for use with formed sheet metal gravel stops, pipe penetrations, and other penetrations through roof deck without a curb.
B. Fabricate with 19 mm (3/4 inch) vertical legs and 75 mm (3 inch) horizontal legs.
C. When used with gravel stop or metal base flashing use same metal for bitumen stop in thickness specified for concealed locations.

2.11 HANGING GUTTERS

A. Fabricate gutters of not less than the following:
1. 0.032 inch thick aluminum..
B. Fabricate hanging gutters in sections not less than 2400 mm (8 feet) long, except at ends of runs where shorter lengths are required.
C. Building side of gutter shall be same height as exterior side.
D. Gutter Bead: Stiffen outer edge of gutter by folding edge over approximately 19 mm (3/4 inch) toward roof and down approximately19 mm (3/4 inch) unless shown otherwise.

E. Gutter Spacers:
   1. Fabricate of same material and thickness as gutter.
   2. Fabricate 25 mm (one inch) wide strap and fasten to gutters not over 900 mm (36 inches) on center.
   3. Turn back edge up 25 mm (one inch) and lap front edge over gutter bead.
   4. Rivet and solder to gutter except rivet and seal to aluminum.
F. Outlet Tubes:
   1. Form outlet tubes to connect gutters to conductors of same metal and thickness as gutters extend into the conductor 75 mm (3 inch). Flange upper end of outlet tube 13 mm (1/2 inch).
   2. Lock and solder longitudinal seam.
   3. Solder tube to gutter.
   4. Fabricate basket strainers of same material as gutters.
G. Gutter Brackets:
   1. Fabricate of same metal as gutter. Use the following:
      a. 6 by 25 mm (1/4 by 1 inch) aluminum.
   2. Fabricate to gutter profile.
   3. Drill two 5 mm (3/16 inch) diameter holes in anchor leg for countersunk flat head screws.

2.12 CONDUCTORS (DOWNSPOUTS)

A. Fabricate conductors of same metal and thickness as gutters in sections approximately 3000 mm (10 feet) long [with 19 mm (3/4 inch) wide flat locked seams].
   1. Fabricate open face channel shape with hemmed longitudinal edges.
B. Fabricate elbows by mitering, riveting, and soldering except seal aluminum in lieu of solder. Lap upper section to the inside of the lower piece.
C. Fabricate conductor brackets or hangers of same material as conductor, 2 mm (1/16 inch) thick by 25 mm (one inch) minimum width. Form to support conductors 25 mm (one inch) from wall surface in accordance with Architectural Sheet Metal Manual Plate 34, Design C for rectangular shapes and E for round shapes.
D. Conductor Heads:
   1. Fabricate of same material as conductor.
   2. Fabricate conductor heads to not less than 250 mm (10 inch) wide by 200 mm (8 inch) deep by 200 mm (8 inches) from front to back.

3. Form front and side edges channel shape not less than 13 mm (1/2 inch) wide flanges with edge hemmed.
4. Slope bottom to sleeve to conductor or downspout at not less than 60 degree angle.
5. Extend wall edge not less than 25 mm (one inch) above front edge.
6. Solder joints for water tight assembly.
7. Fabricate outlet tube or sleeve at bottom not less than 50 mm (2 inches) long to insert into conductor.

2.13 SPLASHPANS

A. Fabricate splashpans from the following:
   1. 0.4 Kg (16 oz) copper.
   2. 0.4 mm (0.015 inch) thick stainless steel.
   3. 1.25 mm (0.050 inch) thick aluminum.
B. Fabricate in accordance with Architectural Sheet Metal Manual Plate 35 with not less than two ribs as shown in alternate section.

2.14 REGLETS

A. Fabricate reglets of one of the following materials:
   1. 0.4 Kg (16 ounce) copper.
   2. Stainless steel, not less than 0.3 mm (0.012 inch) thick.
   3. Plastic coated extruded aluminum, not less than 1.4 mm (0.055 inch) thick prefilled with butyl rubber sealer and complete with plastic wedges inserted at 1000 mm (40 inches) on centers.
   4. Plastic, ASTM D1784, Type II, not less than 2 mm (0.075 inch) thick.
B. Fill open-type reglets with fiberboard or other suitable separator, to prevent crushing of the slot during installation.
C. Bend edges of reglets for setting into concrete to an angle of not less than 45 degrees, and make wide enough to provide firm anchorage in the concrete.
D. Fabricate reglets for building into horizontal masonry mortar joints not less than 19 mm (3/4 inch) deep, nor more than 25 mm (one inch) deep.
E. Fabricate mitered corners, fittings, and special shapes as may be required by details.
F. Reglets for concrete may be formed to receive flashing and have a 10 mm (3/8 inch), 45 degree snap lock.

2.15 INSULATED EXPANSION JOINT COVERS

A. Either type optional, use only one type throughout.

B. Types:

1. Construct of two preformed, stainless steel strips, not less than 0.4 mm (0.015 inch) thick, mechanically and adhesively bonded to both sides of a 2 mm (1/16 inch) thick neoprene or butyl sheet, or to a 0.4 mm (32 mil) thick reinforced chlorinated polyethylene sheet. Adhesively attach a 10 mm (3/8 inch) thick sheet of closed cell, neoprene foam insulation, to the underside of the neoprene, butyl, or chlorinated polyethylene sheet.
2. Constructed of a 2 mm (1/16 inch) thick vinyl sheet, flanged at both sides with stainless steel strips not less than 0.4 mm (0.015 inch) thick. Vinyl sheet locked and encased by the stainless steel strip and prepunched for nailing. A 10 mm (3/8 inch) thick closed cell polyvinyl chloride foam insulating strip shall be heat laminated to the underside of the vinyl sheet between the stainless steel strips.

C. Expansion joint covers shall have factory fabricated mitered corners, crossing tees, and other necessary accessories. Furnish in the longest available lengths.

D. Metal flange of sufficient width to extend over the top of the curb and down curb sides 50 mm (2 inches) with hemmed edge for lock to edge strip.

2.16 ENGINE EXHAUST PIPE OR FLUE OR STACK FLASHING

A. Flashing at penetrations through roofing shall consist of a metal collar, sheet metal flashing sleeve and hood.

B. Fabricate collar with roof flange of 1.2 mm (0.047 inch) minimum thick black iron or galvanized steel sheet.

1. Fabricate inside diameter of collar 100 mm (4 inches) larger than the outside diameter of the item penetration the roofing.
2. Extend collar height from structural roof deck to not less than 350 mm (14 inches) above roof surface.
3. Fabricate collar roof flange not less than 100 mm (4 inches) wide.
4. Option: Collar may be of steel tubing 3 mm (0.125 inch) minimum wall thickness, with not less than four, 50 mm x 100 mm x 3 mm (2 inch by 4 inch by 0.125 inch) thick tabs bottom edge evenly spaced around tube in lieu of continuous roof flange. Full butt weld joints of collar.

C. Fabricate sleeve base flashing with roof flange of either copper, stainless steel, or copper clad stainless steel.
   1. Fabricate sleeve roof flange not less than 100 mm (4 inches) wide.
   2. Extend sleeve around collar up to top of collar.
   3. Flange bottom of sleeve out not less than 13 mm (1/24 inch) and soldered to 100 mm (4 inch) wide flange to make watertight.
   4. Fabricate interior diameter 50 mm (2 inch) greater than collar.
D. Fabricate hood counter flashing from same material and thickness as sleeve.
   1. Fabricate the same as pipe counter flashing except allow not less than 100 mm (4 inch) lap below top of sleeve and to form vent space minimum of 100 mm (4 inch) wide.
   2. Hem bottom edge of hood 13 mm (1/2 inch).
   3. Provide a 50 mm (2 inch) deep drawband.
E. Fabricate insect screen closure between sleeve and hood. Secure screen to sleeve with sheet metal screws.

2.17 SCUPPERS

A. Fabricate scuppers with minimum of 100 mm (4 inch) wide flange.
B. Provide flange at top on through wall scupper to extend to top of base flashing.
C. Fabricate exterior wall side to project not less than 13 mm (1/2 inch) beyond face of wall with drip at bottom outlet edge.
D. Fabricate not less than 100 mm (4 inch) wide flange to lap behind gravel stop fascia.
E. Fabricate exterior wall flange for through wall scupper not less than 25 mm (one inch) wide on top and sides with edges hemmed.
F. Fabricate gravel stop bar of 25 mm x 25 mm (one by one inch) angle strip soldered to bottom of scupper.
G. Fabricate scupper not less than 200 mm (8 inch) wide and not less than 125 mm (5 inch) high for through wall scupper.
H. Solder joints watertight.

2.18 GOOSENECK ROOF VENTILATORS

A. Form of 1.3 mm (0.0508 inch) thick sheet aluminum, reinforce as necessary for rigidity, stiffness, and connection to curb, and to be watertight.
   1. Form lower-edge to sleeve to curb.

2. Curb:
   a. Form for 100 mm (4 inch) high sleeve to ventilator.
   b. Form for concealed anchorage to structural curb and to bear on structural curb.
   c. Form bottom edge of curb as counterflashing to lap base flashing.

B. Provide open end with 1.6 mm (16 gage), stainless steel wire guard of 13 mm (1/2 inch) square mesh.
   1. Construct suitable aluminum angle frame to retain wire guard.
   2. Rivet angle frame to end of gooseneck.

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 roofing and 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. Apply a layer of 7 Kg (15 pound) saturated felt followed by a layer of rosin paper to wood surfaces to be covered with copper. Lap each ply 50 mm (2 inch) with the slope and nail with large headed copper nails.
   7. 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.
   8. 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.

9. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
10. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
11. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
12. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
13. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
14. 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.
15. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of bituminous paint.
16. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.
17. Bitumen Stops:
    a. Install bitumen stops for built-up roof opening penetrations through deck and at formed sheet metal gravel stops.
    b. Nail leg of bitumen stop at 300 mm (12 inch) intervals to nailing strip at roof edge before roofing material is installed.

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. Under copings terminate both edges beyond face of wall approximately 6 mm (1/4 inch) with drip edge.
8. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.
9. 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.
10. 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.
11. 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.
12. Turn flashing up not less than 200 mm (8 inch) between masonry or behind exterior veneer.
13. 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.
14. Continue flashing around columns:
    a. Where flashing cannot be inserted in column reglet hold flashing vertical leg against column.

b. Counterflash top edge with 75 mm (3 inch) wide strip of saturated cotton unless shown otherwise. Secure cotton strip with roof cement to column. Lap base flashing with cotton strip 38 mm (1 1/2 inch).

B. Flashing at Top of Concrete Foundation Walls Where concrete is exposed. Turn up not less than 200 mm (8 inch) high and into masonry backup mortar joint or reglet in concrete backup as specified.

C. Flashing at Top of Concrete Floors (except where shelf angles occur): Place flashing in horizontal masonry joint not less than 200 mm (8 inch) below floor slab and extend into backup masonry joint at floor slab 38 mm (1 1/2 inch).

D. Flashing at Cavity Wall Construction: Where flashing occurs in cavity walls turn vertical portion up against backup under waterproofing, if any, into mortar joint. Turn up over insulation, if any, and horizontally through insulation into mortar joint.

E. Flashing at Veneer Walls:
   1. Install near line of finish floors over shelf angles or where shown.
   2. Turn up against sheathing.
   3. At stud framing, hem top edge 19 mm (3/4 inch) and secure to each stud with stainless steel fasteners through sheathing.
   4. At concrete backing, extend flashing into reglet as specified.
   5. Coordinate with installation of waterproofing or asphalt felt for lap over top of flashing.

F. Lintel Flashing when not part of shelf angle flashing:
   1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
   2. Turn ends up 25 mm (one inch) and fold corners to form dam and extend end to face of wall.
   3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.

G. 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.

H. Door Sill Flashing:

1. Install flashing under bottom of plate sills of doors over curbs opening onto roofs. Extend flashing out to form counter flashing or receiver for counter flashing over base flashing. Set in sealant.
2. Extend sill flashing 200 mm (8 inch) beyond jamb opening. Turn ends up one inch in vertical masonry joint, extend end to face of wall. Join to counter flashing for water tight joint.
3. Where doors thresholds cover over waterproof membranes install sill flashing over water proof membrane under thresholds. Extend beyond opening to cover exposed portion of waterproof membrane and not less than 150 mm (6 inch) beyond door jamb opening at ends. Turn up approximately 6 mm (1/4 inch) under threshold.

I. Flashing at Masonry, Stone, or Precast Concrete Copings:
1. Install flashing with drips on both wall faces unless shown otherwise.
2. Form penetration openings to fit tight against dowel or other item with edge turned up. Seal penetrations with sealant.

3.3 BASE FLASHING

A. Install where roof membrane type base flashing is not used and where shown.
1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.
3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
4. Secure flange by nailing through roofing into wood blocking with nails spaced 75 mm (3 inch) on centers or, when flange over 100 mm (4 inch) wide terminate in a 13 mm (1/2 inch) folded edge anchored with cleats spaced 200 mm (8 inch) on center. Secure one end of cleat over nail heads. Lock other end into the seam.

B. For long runs of base flashings install in lengths of not less than 2400 mm (8 feet) nor more than 3000 mm (ten feet). Install a 75 mm (3 inch) wide slip type, loose lock expansion joint filled with sealant in joints of base flashing sections over 2400 mm (8 feet) in length. Lock and solder corner joints at corners.

C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 75 mm (3 inch).

3.4 COUNTERFLASHING (CAP FLASHING OR HOODS)

A. General:
   1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
   2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
   3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
   4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
   5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
   6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

B. One Piece Counterflashing:
   1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
   2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
   3. Where flashing is surface mounted on flat surfaces.
      a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center:
         1) Locate fasteners in masonry mortar joints.
         2) Use screws to sheet metal or wood.
      b. Fill joint at top with sealant.
   4. Where flashing or hood is mounted on pipe.
      a. Secure with draw band tight against pipe.
      b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
      c. Completely fill joint at top with sealant.

C. Two-Piece Counterflashing:

1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
2. Surface applied type receiver:
   a. Secure to face construction in accordance, with manufacturers instructions.
   b. Completely fill space at the top edge of receiver with sealant.
3. Insert counter flashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.

D. Where vented edge occur install so lower edge of counterflashing is against base flashing.

E. When counter flashing is a component of other flashing install as shown.

3.5 REGLETS

A. Install reglets in a manner to provide a watertight installation.

B. Locate reglets not less than 225 mm (9 inch) nor more than 400 mm (16 inch) above roofing, and not less than 125 mm (5 inch) nor more than 325 mm (13 inch) above cant strip.

C. Butt and align end joints or each section of reglet and securely hold in position until concrete or mortar are hardened:
   1. Coordinate reglets for anchorage into concrete with formwork construction.
   2. Coordinate reglets for masonry to locate horizontally into mortar joints.

3.6 GRAVEL STOPS

A. General:
   1. Install gravel stops and fascias with allowance for expansion at each joint; minimum of 6 mm (1/4 inch).
   2. Extend roof flange of gravel stop and splice plates not less than four inches out over roofing and nail or screw to wood nailers. Space fasteners on 75 mm (3 inch) centers in staggered pattern.
   3. Install continuous cleat for fascia drip edge. Secure with fasteners as close to lower edge as possible on 75 mm (3 inch) centers.
   4. Where ends of gravel stops and fascias abut a vertical wall, provide a watertight, flashed and sealant filled joint.
   5. Set flange in roof cement when installed over built-up roofing.

6. Edge securement for low-slope roofs: Low-slope membrane roof systems metal edge securement, except gutters, shall be designed in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be determined from Figure 1609, of IBC 2003.

B. Sheet metal gravel stops and fascia:
1. Install with end joints of splice plates sheets lapped three inches.
2. Hook the lower edge of fascia into a continuous edge strip.
3. Lock top section to bottom section for two piece fascia.

C. Corrugated sheet gravel stops and fascia:
1. Install 300 mm (12 inch) wide sheet flashing centered under joint. A combination bottom and cover plate, extending above and beneath the joint, may be used.
2. Hook lower edge of fascia into a continuous edge strip.

D. Scuppers:
1. Install scupper with flange behind gravel stops; leave 6 mm (1/4 inch) joint to gravel stop.
2. Set scupper at roof water line and fasten to wood blocking.
3. Use sealant to seal joint with fascia gravel stops at ends.
4. Coordinate to lap over conductor head and to discharge water into conductor head.

3.7 COPINGS

A. General:
1. On walls topped with a wood plank, install a continuous edge strip on the front and rear edge of the plank. Lock the coping to the edge strip with a 19 mm (3/4 inch) loose lock seam.
2. Where shown turn down roof side of coping and extend down over base flashing as specified for counter-flashing. Secure counter-flashing to lock strip in coping at continuous cleat.
3. Install ends adjoining existing construction so as to form space for installation of sealants. Sealant is specified in Section 07 92 00, JOINT SEALANTS.

B. Aluminum Coping:
1. Install with 6 mm (1/4 inch) joint between ends of coping sections.
2. Install joint covers, centered at each joint, and securely lock in place.

C. Stainless steel Copings:

1. Join ends of sheets by a 19 mm (3/4 inch) locked and soldered seam, except at intervals of 9600 mm (32 feet), provide a 38 mm (1 1/2 inch) loose locked expansion joint filled with sealant or mastic.
2. At straight runs between 7200 mm (24 feet) and 19200 mm (64 feet) locate expansion joint at center.
3. At straight runs that exceed 9600 mm (32 feet) and form the leg of a corner locate the expansion joint not more than 4800 mm (16 feet) from the corner.

3.8 EXPANSION JOINT COVERS, INSULATED

A. Install insulated expansion joint covers at locations shown on curbs not less than 200 mm (8 inch) high above roof surface.
B. Install continuous edge strips of same metal as expansion joint flange, nailed at not less than 75 mm (3 inch) centers.
C. Install insulated expansion joint covers in accordance with manufacturer's directions locking edges to edge strips.

3.9 ENGINE EXHAUST PIPE OR STACK FLASHING

A. Set collar where shown and secure roof tabs or flange of collar to structural deck with 13 mm (1/2 inch) diameter bolts.
B. Set flange of sleeve base flashing not less than 100 mm (4 inch) beyond collar on all sides as specified for base flashing.
C. Install hood to above the top of the sleeve 50 mm (2 inch) and to extend from sleeve same distance as space between collar and sleeve beyond edge not sleeve:
   1. Install insect screen to fit between bottom edge of hood and side of sleeve.
   2. Set collar of hood in high temperature sealant and secure with one by 3 mm (1/8 inch) bolt on stainless steel draw band type, or stainless steel worm gear type clamp. Install sealant at top of head.

3.10 HANGING GUTTERS

A. Hang gutters with high points equidistant from downspouts. Slope at not less than 1:200 (1/16 inch per foot).
B. Lap joints, except for expansion joints, at least 25 mm (one inch) in the direction of flow. Rivet and seal or solder lapped joints.

C. Support gutters in brackets spaced not more than 600 mm (24 inch) on centers, brackets attached to facial or wood nailer by at least two screws or nails.
   1. For copper or copper clad stainless steel gutters use brass or bronze brackets.
   2. For stainless steel gutters use stainless steel brackets.
   3. For aluminum gutters use aluminum brackets or stainless steel brackets.
   4. Use brass or stainless steel screws.
D. Secure brackets to gutters in such a manner as to allow free movement of gutter due to expansion and contraction.
E. Gutter Expansion Joint:
   1. Locate expansion joints midway between outlet tubes.
   2. Provide at least a 25 mm (one inch) expansion joint space between end baffles of gutters.
   3. Install a cover plate over the space at expansion joint.
   4. Fasten cover plates to gutter section on one side of expansion joint only.
   5. Secure loose end of cover plate to gutter section on other side of expansion joint by a loose-locked slip joint.
F. Outlet Tubes: Set bracket strainers loosely into gutter outlet tubes.

3.11 CONDUCTORS (DOWNSPOUTS)

A. Where scuppers discharge into downspouts install conductor head to receive discharge with back edge up behind drip edge of scupper. Fasten and seal joint. Sleeve conductors to gutter outlet tubes and fasten joint and joints between sections.
B. Set conductors plumb and clear of wall, and anchor to wall with two anchor straps, located near top and bottom of each section of conductor. Strap at top shall be fixed to downspout, intermediate straps and strap at bottom shall be slotted to allow not less than 13 mm (1/2 inch) movement for each 3000 mm (10 feet) of downspout.
C. Install elbows, offsets and shoes where shown and required. Slope not less than 45 degrees.

3.12 SPLASH PANS

A. Install where downspouts discharge on low slope roofs unless shown otherwise.

B. Set in roof cement prior to pour coat installation or sealant compatible with single ply roofing membrane.

3.13 GOOSENECK ROOF VENTILATORS

A. Install on structural curb not less than 200 mm (8 inch) high above roof surface.

B. Securely anchor ventilator curb to structural curb with fasteners spaced not over 300 mm (12 inch) on center.

C. Anchor gooseneck to curb with screws having nonprene washers at 150 mm (6 inch) on center.

- - - E N D - - -

SECTION 07 71 00
ROOF SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies equipment supports.

1.2 RELATED WORK

A. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.

C. General insulation: Section 07 21 13, THERMAL INSULATION. Rigid insulations for roofing: Section 07 22 00, ROOF AND DECK INSULATION

1.3 QUALITY CONTROL

A. All roof accessories shall be the products of manufacturers regularly engaged in producing the kinds of products specified.

B. Each accessory type shall be the same and be made by the same manufacturer.

C. Each accessory shall be completely assembled to the greatest extent possible before delivery to the site.

1.4 SUBMITTALS

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

B. Samples: Representative sample panel of color anodized aluminum not less than 100 mm X 100 mm (four by four inches), except extrusions shall be a width not less than section to be used. Sample shall show coating with integral color and texture and shall include manufacturer's identifying label.

C. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.

D. Manufacturer's Literature and Data: Each item specified.

E. Certificates: Stating that aluminum has been given specified thickness of anodizing.

1.5 APPLICABLE PUBLICATIONS

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

B. Federal Specifications (Fed. Spec.):

RR-G-1602D.....Grating, Metal, Other Than Bar Type (Floor, Except for Naval Vessels)

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

A653/A653M-13.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) By the Hot-Dip Process

B209/209M-10.....Aluminum and Aluminum Alloy-Sheet and Plate

B221/221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

C612-14.....Mineral Fiber Block and Board Thermal Insulation

D1187-97(R2011)e1.....Asphalt-Base Emulsions for Use as Protective Coatings for Metal

D. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual

E. American Architectural Manufacturers Association (AAMA):
2605-13.....High Performance Organic Coatings on Architectural Extrusions and Panels.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum, Extruded: ASTM B221/B221M-13.

B. Aluminum Sheet: ASTM B209/B209M-10.

C. Galvanized Sheet Steel: ASTM A526/A526M; G-90 coating.

2.2 EQUIPMENT SUPPORTS

A. Fabricate equipment supports from 1.3 mm (0.0516 inch) thick galvanized steel.

B. Form exterior curb with integral base and deck closures for curbs installed on steel decking.

C. Use galvanized steel liners for curbs having inside dimension over 305 mm (12 inches).

D. Fabricate curb with a minimum height of 200 mm (8 inches) above roof surface.

E. Attach preservative treated wood nailers to top of curb. Use 50 mm (2 inch) by 50 mm (2 inch) minimum nominal size on curb with openings and 50 mm (2 inch) thick, width of curb up to 300 mm (12 inches) on equipment support curbs.

F. Make size of supports suit size of equipment furnished, with height as shown on drawings, but not less than 200 mm (8 inches) above roof surface.

2.3 FINISH

A. In accordance with NAAMM Amp 500 Series.

B. Aluminum, Mill Finish: AA-M1x, as fabricated.

C. Aluminum, Clear Finish: AA-C22A41 medium matte, clear anodic coating, Class 1, Architectural, 0.7 mils thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof specialties where shown.

B. Secure with fasteners in accordance with manufacture's printed installation instructions and approved shop drawings unless shown otherwise.

C. Coordinate to install insulation where shown; see Section 07 21 13, THERMAL INSULATION and Section 07 22 00, ROOF AND DECK INSULATION.

D. Comply with section 07 92 00, JOINT SEALANTS to install sealants where manufactures installation instructions require sealant.

E. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.

   b. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.

   c. Install expansion joint cover with 6 mm (1/4 inch) wide space at end joints and tension bars at 600 mm (24 inches) on center.

   d. Install cover plates with formed aluminum flashing concealed and centered on joint. Flashing to lap cover not less than 100 mm (4 inches).

J. Equipment Supports: Do not anchor to insulating concrete or metal deck. Anchor only to building structure as per manufacturers recommendations.

3.2 PROTECTION OF ALUMINUM

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on side.

B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two coats of asphalt coating.

3.3 ADJUSTING

A. Adjust roof hatch hardware to operate freely and so that cover will operate without binding, close tightly at perimeter, and latch securely.

3.4 PROTECTION

Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 72 00
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies copings, gravel stops, fascias, and expansion joints.

1.2 RELATED WORK

A. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.

B. General insulation: Section 07 21 13, THERMAL INSULATION

C. Rigid insulations for roofing: Section 07 22 00, ROOF AND DECK INSULATION

1.3 QUALITY CONTROL

A. All roof accessories shall be the products of manufacturers regularly engaged in producing the kinds of products specified.

B. Each accessory type shall be the same and be made by the same manufacturer.

C. Each accessory shall be completely assembled to the greatest extent possible before delivery to the site.

1.4 SUBMITTALS

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

B. Samples: Representative sample panel of color anodized aluminum not less than 100 mm X 100 mm (four by four inches), except extrusions shall be a width not less than section to be used. Sample shall show coating with integral color and texture and shall include manufacturer's identifying label.

C. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.

D. Manufacturer's Literature and Data: Each item specified.

E. Certificates: Stating that aluminum has been given specified thickness of anodizing.

1.5 APPLICABLE PUBLICATIONS

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

B. American Society for Testing and Material (ASTM):
B209/209M-10.....Aluminum and Aluminum Alloy-Sheet and Plate

B221/221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

C612-14.....Mineral Fiber Block and Board Thermal Insulation

D1187-97(2011)e1.....Asphalt-Base Emulsions for Use as Protective Coatings for Metal

C. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual

D. American Architectural Manufacturers Association (AAMA):
2605-11.....High Performance Organic Coatings on Architectural Extrusions and Panels.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum, Extruded: ASTM B221/B221M-13.

B. Aluminum Sheet: ASTM B209/B209M-10.

C. Galvanized Sheet Steel: ASTM A526/A526M; G-90 coating.

D. Insulation: ASTM C612, Class 1 or 2.

~~E~~. Asphalt Coating: ASTM D 1187-97(2011)e1, Type I, quick setting.

2.2 COPINGS

A. Fabricate of aluminum not less than 1.6 mm (0.063 inch thick).

B. Turn outer edges down each face of wall as shown.

C. Maximum lengths of 3000 mm (10 feet).

D. Shop fabricate external and internal corners as one piece assemblies with not less than 300 mm (12 inch) leg lengths.

E. Copings shall be Category 5 FM rated.

F. Provide 100 mm (four inch) wide 0.8 mm (0.032 inch) thick watertight joint covers.

G. Provide anchor gutter bar of 0.8 mm (0.032 inch) thick with anchor holes formed for underside of joint.

H. Provide concealed guttered splice plate of 0.8 mm (0.032 inch) thick with butyl or other resilient seal strips anchored to splice plate for underside of joint. Use galvanized steel anchor plate providing compression spring anchoring of coping cover.

I. Finish: Anodized as specified.

2.3 EXTRUDED ALUMINUM GRAVEL STOPS AND FASCIAS

A. Fabricate of aluminum not less than 2 mm (0.078 inch) thick.

B. Turn fascia down face of wall and up above roof as shown.

C. Maximum lengths of 3000 mm (10-feet).

D. Shop fabricate external and internal corners as one piece assemblies with not less than 300 mm (12 inch) leg lengths.

E. Provide 100 mm (four inch) wide 2 mm (0.078 inch) thick watertight joint covers with 150 mm (six inch) wide 0.8 mm (0.030 inch) thick underside joint flashing.

2.4 EXTRUDED ALUMINUM FASCIA-CANT SYSTEM

A. The fascia-cant system consists of three pieces, an extruded aluminum fascia, a galvanized steel cant, and an aluminum compression clamp.

B. Furnish in stock lengths of not more than 3000 mm (10 feet) long.

C. Form fascia from not less than 2 mm (0.070 inch) thick aluminum. Provide four inch wide 0.8 mm (0.032-inch) thick concealed sheet aluminum joint cover plates in back of fascia.

D. Form cant strip from galvanized steel not less than 0.8 mm (0.0299 inch) thick, to profile shown and design to hold lower edge of the fascia.

E. Form compression clamp of not less than 0.8 mm (0.032 inch) thick aluminum designed to hold the top edge of the fascia and the built-up flashing.

F. Internal and external corners:

1. Factory fabricate and fully weld mitered joints.
2. Furnish corner sections in manufacturers standard sizes with not less than 300 mm (12 inch) leg lengths.

I. Finish on aluminum: anodized as specified.

2.5 EXTRUDED ALUMINUM ROOF EXPANSION JOINT COVERS

A. Fabricate in 3000 mm (10 foot) lengths with fastener openings slotting for expansion not over 600 mm (24 inch) centers.

B. Provide four-way expansion, for joint widths shown.

C. Mill finish on aluminum.

D. Form waterstop or moisture seals of continuous sheets of neoprene, not less than 0.8 mm (0.032 inch) thick.

E. Fabricate corners as one piece assembly with mitered and welded joint and least dimension legs not less than 300 mm (12 inches) long.

F. Factory fabricate end caps and transitions to insure waterproof assembly.

G. Three piece assembly:
   1. Roof expansion joint cover system consists of an extruded aluminum cover, extruded frame or curb vertical section, galvanized steel cant, and aluminum compression clamp counter flashing, complete with moisture seals. Form cover and vertical section from extruded aluminum, 2 mm (0.080 inch) minimum thickness with spring stainless steel tension or pivot bar.
   2. Form cant from galvanized steel not less than 0.8 (0.029 inch) thick formed to profile shown.
   3. Form splice plates of not less than 0.8 mm (0.032 inch) thick aluminum sheet.
   4. Form counter flashing member of 1.3 mm (0.050 inch) thick sheet aluminum, secured with screws to the top edge of the vertical section and providing compression clamp over base flashing.
   5. Provide compression gasket separating cover from curb bearing.

H. Two piece assembly:
   1. Roof expansion joint system consists of an extruded aluminum cover combination extruded aluminum frame or curb with integral adjustable counter flashing flange, and moisture seals.
   2. Form cover from extruded aluminum 2 mm (0.078 inch) minimum thickness.
   3. Form cover anchor system of stainless steel pivot bar.
   4. Form frame assembly of not less than 2 mm (0.076 inch) aluminum except for flashing portion.
   5. Provide compression gasket separating cover from curb at bearing.

2.6 FINISH

A. In accordance with NAAMM Amp 500-505.

B. Aluminum Colored Finish: AA-C22A42, anodized,Class 1, Architectural, 0.7 mils thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof accessories where shown.

B. Secure with fasteners in accordance with manufacture's printed installation instructions and approved shop drawings unless shown otherwise.

C. Coordinate to install insulation where shown; see Section 07 21 13, THERMAL INSULATION and Section 07 22 00, ROOF AND DECK INSULATION.

D. Comply with section 07 92 00, JOINT SEALANTS to install sealants where manufactures installation instructions require sealant.

E. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.

F. Gravel Stops and Fascias:

1. Install gravel stops and fascia with butt joints with approximately 6 mm (1/4 inch) space for expansion.
2. Over each joint provide cover plates of sheet aluminum, complete with concealed sheet aluminum flashing, centered under each joint.
3. Lap cover plates and concealed flashing over the gravel stop and fascia not less than four inches.
4. Extend concealed flashing over built-up roofing, embed in roof cement and turn down over face of blocking at roof edge.

G. Aluminum Coping:

1. Install sections of coping with approximately 6 mm (1/4-inch) space between ends of sections.
2. Center joint gutter bar and covers at joints and securely lock in place.
3. When snap-on system is used insure front and back edges are locked in place.

H. Fascia-Cant System:

1. Install galvanized steel cant; coordinate with roofing work and after completion of roofing work install extruded aluminum fascia, concealed joint cover plate, and aluminum compression clamp, where shown.
2. Install system to allow for expansion and contraction with 6 mm (1/4 inch) space between extruded aluminum members and galvanized steel cant as required by manufacturer of system.
3. Offset joints in extruded aluminum members from galvanized steel cant joints.

I. Expansion Joint Covers:

1. Install to terminate base flashing 200 mm (8 inches) above roof.
2. Install moisture seals to drain water to outlets that do not permit water to enter buildings construction.
3. Use stainless steel screws when exposed.
4. Three piece assembly:

a. Install curb section with screws to wood blocking, allowing 6 mm (1/4 inch) at butt joints between sections with splice plate at joint.
b. Install cant to wood blocking by nailing along horizontal flange every 150 mm (6 inches), with galvanized roofing nails 25 mm (one inch) long.
c. After completion of base flashing install cap flashing and compression clamp and fasten to the curb or metal cant with stainless steel self-tapping screws with neoprene washers under head spaced approximately 450 mm (18 inches) on center.
d. Install expansion joint cover with a 6 mm (1/4 inch) wide end joints.
e. Install over end joint a cover plate complete with concealed aluminum flashing, centered under each joint. Fabricate flashing to lap cover not less than four inches.

5. Two piece assembly:
   a. Install curb section with screws allowing 6 mm (1/4 inch) space at end joints with splice plate at joint.
   b. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.
   c. Install expansion joint cover with 6 mm (1/4 inch) wide space at end joints and tension bars at 600 mm (24 inches) on center.
   d. Install cover plates with formed aluminum flashing concealed and centered on joint. Flashing to lap cover not less than 100 mm (4 inches).

3.2 PROTECTION OF ALUMINUM

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on side.
B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two coats of asphalt coating.

3.3 ADJUSTING

Adjust expansion joints to close tightly and be watertight; insuring maximum allowance for building movement.

3.4 PROTECTION

Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 81 00
APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies mineral fiber and cementitious coverings to provide fire resistance to interior structural steel members shown.

1.2 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Manufacturer's complete and detailed application instructions and specifications.
2. Manufacturer's repair and patching instructions.

C. Certificates:

1. Certificate from testing laboratory attesting fireproofing material and application method meet the specified fire ratings.
   a. List thickness and density of material required to meet fire ratings.
   b. Accompanied by complete test report and test record.
2. Manufacturer's certificate indicating sprayed-on fireproofing material supplied under the Contract is same within manufacturing tolerance as fireproofing material tested.

D. Miscellaneous:

1. Manufacturer's written approval of surfaces to receive sprayed-on fireproofing.
2. Manufacturer's written approval of completed installation.
3. Manufacturer's written approval of the applicators of fireproofing material.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver to job-site in sealed containers marked and labeled to show manufacturer's name and brand and certification of compliance with the specified requirements.

B. Remove damaged containers from the site.

C. Store the materials off the ground, under cover, away from damp surfaces.

D. Keep dry until ready for use.

E. Remove materials that have been exposed to water before installation from the site.

1.4 QUALITY CONTROL

A. Test for fire endurance in accordance with ASTM E119, for fire rating specified, in a nationally recognized laboratory.

B. Manufacturer's inspection and approval of surfaces to receive fireproofing as specified under paragraph Examination.

C. Manufacturer's approval of fireproofing applications.

D. Manufacturer's approval of completed installation.

E. Manufacturer's representative shall observe and advise at the commencement of application, and shall visit the site as required thereafter for the purpose of ascertaining proper application.

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 the basic designation only.

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

C841-03(R2008).....Installation of Interior Lathing and Furring

E84-10.....Surface Burning Characteristics of Building Materials

E119-10.....Fire Tests of Building Construction and Materials

E605-93(R2006).....Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members

E736-00(R2006).....Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

E759-92(R2005).....The Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

E760-92(R2005).....Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

E761-92(R2005).....Compressive Strength of Fire-Resistive Material Applied to Structural Members

E859-93(R2006).....Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members

E937-93(R2005).....Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members

E1042-02(R2008).....Acoustically, Absorptive Materials Applied by Trowel or Spray.

G21-09.....Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory...Latest Edition including Supplements

D. Warnock Hersey (WH):

Certification Listings..Latest Edition

E. Factory Mutual System (FM):

Approval Guide.....Latest Edition including Supplements

PART 2 - PRODUCTS

2.1 SPRAYED-ON FIREPROOFING

A. ASTM E1042, Class (a), Category A.

1. Type I, factory mixed cementitious materials with approved aggregate.
2. Type II, factory mixed mineral fiber with integral inorganic binders minimum 240 kg/m^3 (15 1b/ft^3) density per ASTM E605 test unless specified otherwise. Use in areas that are completely encased.

B. Materials containing asbestos are not permitted.

C. Fireproofing characteristics when applied in the thickness and density required to achieve the fire-rating specified.

	Characteristic	Test	Results
1.	Deflection	ASTM E759	No cracking, spalling, or delamination when backing to which it is applied has a deflection up to 1/120 in 3m (10 ft.)
2.	Corrosion-Resistance	ASTM E937	No promotion of corrosion of steel.
3.	Bond Impact	ASTM E760	No cracking, spalling, or delamination.
4.	Cohesion/Adhesion (Bond Strength)	ASTM E736	Minimum cohesive/adhesive strength of 9.57 kPa (200 lbf/ft^2) for protected areas. 19.15 kPa (400 lbf/ft^2) for exposed areas.
5.	Air Erosion	ASTM E859	Maximum gain weight of the collecting filter 0.27gm/m^2 (0.025 gm/ft^2).
6.	Compressive Strength	ASTM E761	Minimum compressive strength 48

			kPa (1000psf).
7.	Surface Burning Characteristics with adhesive and sealer to be used	ASTM E84	Flame spread 25 or less smoke developed 50 or less
8.	Fungi Resistance	ASTM G21	Resistance to mold growth when inoculated with aspergillus niger (28 days for general application)

2.2 ADHESIVE

A. Bonding adhesive for Type II (fibrous) materials as recommended and supplied by the fireproofing material manufacturer.

B. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

2.3 SEALER

A. Sealer for Type II (fibrous) material as recommended and supplied by the fireproofing material manufacturer.

B. Surface burning characteristics as specified for fireproofing material.

C. Fungus resistant.

D. Sealer may be an integral part of the material or applied separately to the exposed surface. When applied separately use contrasting color pigmented sealer, white preferred.

2.4 WATER

A. Clean, fresh, and free from organic and mineral impurities.

B. pH of 6.9 to 7.1.

2.5 MECHANICAL BOND MATERIAL

A. Expanded Metal Lath: ASTM C847, minimum weight of 0.92 kg/m^2 (1.7 pounds per square yard).

B. Fasteners: ASTM C841.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify surfaces to receive fireproofing are clean and free of dust, soot, oil, grease, water soluble materials or any foreign substance which would prevent adhesion of the fireproofing material.

B. Verify hangers, inserts and clips are installed before the application of fireproofing material.

C. Verify ductwork, piping, and other obstructing material and equipment is not installed that will interfere with fireproofing installation.

D. Verify concrete work on steel decking and concrete encased steel is completed.

E. Verify temperature and enclosure conditions are required by fire-proofing material manufacturer.

3.2 APPLICATION

A. Do not start application until written approval has been obtained from manufacturer of fireproofing materials that surfaces have been inspected by the manufacturer or his representative, and are suitable to receive sprayed-on fireproofing.

B. Coordinate application of fireproofing material with other trades.

C. Mix and apply in accordance with manufacturer's instructions.

1. Mechanically control material and water ratios.
2. Apply adhesive and sealer, when not an integral part of the materials, in accordance with the manufacturer's instructions.
3. Apply to density and thickness indicated in UL Fire Resistance Directory, FM Approval Guide, or WH Certification Listings unless specified otherwise. Test in accordance with ASTM E119.
4. Minimum applied dry density per cubic meter (cubic foot) for the beam and steel deck, columns in interstitial spaces and mechanical equipment rooms shall be as follows:
   a. Type I - 240 kg/m^3 (15 lb/ft^3).
   b. Type II - 350 kg/m^3 (22 lb/ft^3).

E. Application shall be completed in one area, inspected and approved by Contracting officer representative before removal of application equipment and proceeding with further work.

3.3 FIELD TESTS

A. Tests of applied material will be performed by VA retained Testing Laboratory. See Section 01 45 29, TESTING LABORATORY SERVICES.

B. Contracting officer representative will select area to be tested in specific bays on each floor using a geometric grid pattern.

C. Test for thickness and density in accordance with ASTM E605. Areas showing thickness less than that required as a result of fire endurance test will be rejected.

D. Areas showing less than required fireproofing characteristics will be rejected on the following field tests.

1. Test for cohesion/adhesion: ASTM E736.
2. Test for bond impact strength: ASTM E760.

3.3 PATCHING AND REPAIRING

A. Inspect after mechanical, electrical and other trades have completed work in contact with fireproofing material, but before sprayed material is covered by subsequent construction.

B. Perform corrective measures in accordance with fireproofing material Manufacturer's recommendations.

1. Respray areas requiring additional fireproofing material to provide the required thickness, and replace dislodged or removed material.
2. Spray material for patching by machine directly on point to be patched, or into a container and then hand apply.
3. Hand mixing of material is not permitted.

C. Repair:

1. Respray all test and rejected areas.
2. Patch fireproofing material which is removed or disturbed after approval.

D. Perform final inspection of sprayed areas after patching and repair.

3.4 SCHEDULE

A. Apply fireproofing material on interior and exterior structural steel members and on underside of steel roof decks, except on following surfaces:

1. Structural steel and underside of steel decks in elevator or dumbwaiter machine rooms.
2. Steel members in elevator hoist ways.
3. Areas used as air handling plenums.

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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. Spray applied fireproofing: Section 07 81 00, APPLIED FIREPROOFING

B. Sealants and application: Section 07 92 00, JOINT SEALANTS.

C. Fire and smoke damper assemblies in ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS, Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 SUBMITTALS

A. Submit in accordance with 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. 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.

1.4 DELIVERY AND STORAGE

A. Deliver materials in their original unopened containers with manufacturer’s name and product identification.

B. Store in a location providing protection from damage and exposure to the elements.

1.5 WARRANTY

Firestopping work subject to the terms of the Article “Warranty of Construction”, FAR clause 52.246-21, except extend the warranty period to five years.

1.6 QUALITY ASSURANCE

FM, UL, or WH or other approved laboratory tested products will be acceptable.

1.7 APPLICABLE PUBLICATIONS

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

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

E84-10.....Surface Burning Characteristics of Building Materials

E814-11.....Fire Tests of Through-Penetration Fire Stops

C. Factory Mutual Engineering and Research Corporation (FM):

Annual Issue Approval Guide Building Materials

D. Underwriters Laboratories, Inc. (UL):

Annual Issue Building Materials Directory

Annual Issue Fire Resistance Directory

1479-10.....Fire Tests of Through-Penetration Firestops

E. 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. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 100 mm (4 in) nominal pipe or 0.01 m^2 (16 sq. in.) in overall cross sectional area.

C. 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.

D. Firestop sealants used for firestopping or smoke sealing 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.

E. 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.

F. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84.

G. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.

H. Materials to be asbestos free.

I. Firetopping system or device in zero hour rated construction shall be white or grey in color. Firestopping system or device in all other rated construction shall be red in color.

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

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 Contracting officer representative.

C. Clean up spills of liquid type materials.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

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. Masonry control and expansion joint: Section 04 20 00, UNIT MASONRY.

B. Firestopping penetrations: Section 07 84 00, FIRESTOPPING.

C. Glazing: Section 08 80 00, GLAZING.

D. Glazed aluminum curtain wall: Section 08 44 13, GLAZED ALUMINUM CURTAIN WALLS.

E. Sound rated gypsum partitions/sound sealants: Section 09 29 00, GYPSUM BOARD.

F. Mechanical Work: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION, Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.3 QUALITY CONTROL:

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
3. Test elastomeric joint sealants according to SWRI’s Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.

4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates in accordance with sealant manufacturer’s recommendations:

1. Locate test joints where indicated or, if not indicated, as directed by COR.
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 COR seven days in advance of dates and times when test joints will be erected.

E. VOC: Acrylic latex and Silicon sealants shall have less than 50g/l VOC content.

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 32° C (90° F) or less than 5° C (40° 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.

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(2011).....Elastomeric Cellular Preformed Gasket and Sealing Material.

C612-14.....Mineral Fiber Block and Board Thermal Insulation.

C717-14a.....Standard Terminology of Building Seals and Sealants.

C834-14.....Latex Sealants.

C919-12.....Use of Sealants in Acoustical Applications.

C920-14a.....Elastomeric Joint Sealants.

C1021-08(2014).....Laboratories Engaged in Testing of Building Sealants.

C1193-13.....Standard Guide for Use of Joint Sealants.

C1330-02(2013).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

D1056-14.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

E84-09.....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:
1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 20-40

B. S-2:
1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade P.
5. Shore A hardness of 25-40.

C. S-3:
1. ASTM C920, polyurethane or polysulfide.
2. Type S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-25.
6. Minimum elongation of 700 percent.

D. S-4:
1. ASTM C920 polyurethane or polysulfide.
2. Type S.
3. Class 25.
4. Grade NS.

5. Shore A hardness of 25-40.

E. S-5:

1. ASTM C920, polyurethane or polysulfide.
2. Type S.
3. Class 25.
4. Grade P.
5. Shore hardness of 15-45.

F. S-6:

1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class: Joint movement range of plus 100 percent to minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-20.
6. Minimum elongation of 1200 percent.

G. S-7:

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.

H. S-8:

1. ASTM C920, silicone, acetoxy cure.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Structural glazing application.

I. S-9:

1. ASTM C920 silicone.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Non-yellowing, mildew resistant.

J. S-10:

1. ASTMC C920, coal tar extended fuel resistance polyurethane.
2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 15-20.

K. S-11:
1. ASTM C920 polyurethane.
2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 35 to 50.

L. S-12:
1. ASTM C920, polyurethane.
2. Type M/S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade P/NS.
5. Shore A hardness of 25 to 50.

2.2 CAULKING COMPOUND:

A. C-1: ASTM C834, acrylic latex.

B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

2.3 COLOR:

A. Color of sealants shall match adjacent surfaces, unless specified otherwise.

B. Caulking shall match adjacent surface, 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 POUROUS SURFACES:

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 polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not use sealant type listed by manufacture as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool joints to concave surface unless shown or specified otherwise.
8. Finish paving or floor joints flush unless joint is otherwise detailed.
9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant.

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. 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.

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-1, S-2
   2. Metal to Masonry or Stone: Type S-1
   3. Masonry to Masonry or Stone: Type S-1
   4. Cast Stone to Cast Stone: Type S-1
   5. Threshold Setting Bed: Type S-1, S-3, S-4
   6. Masonry Expansion and Control Joints: Type S-6
B. Metal Reglets and Flashings:
   1. Flashings to Wall: Type S-6
   2. Metal to Metal: Type S-6

C. Sanitary Joints:

1. Walls to Plumbing Fixtures: Type S-9
2. Counter Tops to Walls: Type S-9
3. Pipe Penetrations: Type S-9

D. High Temperature Joints over 204 degrees C (400 degrees F):

1. Exhaust Pipes, Flues, Breech Stacks: Type S-7 or S-8

E. Interior Caulking:

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 C-1 and C-2.
3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types C-1 and C-2.
4. Perimeter of Lead Faced Control Windows and Plaster or Gypsum Wallboard Walls: Types C-1 and C-2.
5. Concealed Acoustic Sealant Types S-4, C-1 and C-2.

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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. Wood doors for hollow metal frames: Section 08 14 00, INTERIOR WOOD DOORS.

B. Door Hardware: Section 08 71 00, DOOR HARDWARE.

C. Glazing: Section 08 80 00, GLAZING.

D. Card readers: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEM.

1.3 TESTING

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.

B. Federal Specifications (Fed. Spec.):

L-S-125B.....Screening, Insect, Nonmetallic

C. Door and Hardware Institute (DHI):

A115 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)

D. Steel Door Institute (SDI):

113-01 (R2006).....Thermal Transmittance of Steel Door and Frame Assemblies

128-09.....Acoustical Performance for Steel Door and Frame Assemblies

E. American National Standard Institute:

A250.8-2003 (R2008).....Specifications for Standard Steel Doors and Frames

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

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A568/568-M-13ae1.....Steel, Sheet, Carbon, and High-Strength, Low-alloy, Hot-Rolled and Cold-Rolled

A1008-13.....Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability

D1621-10.....Compressive Properties of Rigid Cellular Plastics

E90-09.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

G. The National Association Architectural Metal Manufactures (NAAMM):

Metal Finishes Manual (AMP 500-06)

H. National Fire Protection Association (NFPA):

80-13.....Fire Doors and Fire Windows

I. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory

J. Intertek Testing Services (ITS):

Certifications Listings…Latest Edition

K. Factory Mutual System (FM):

Approval Guide

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sheet Steel: ASTM A1008, cold-rolled for panels (face sheets) of doors.

B. Anchors, Fastenings and Accessories: Fastenings anchors, clips connecting members and sleeves from zinc coated steel.

C. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

2.2 FABRICATION GENERAL

A. GENERAL:

1. Follow ANSI 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 ANSI A250.8. Thickness, 44 mm (1-3/4 inches), unless otherwise shown.
2. Close top edge of exterior doors flush and seal to prevent water intrusion.
3. When vertical steel stiffeners are used for core construction, fill spaces between stiffeners with mineral fiber insulation.

B. Standard Duty Doors: ANSI A250.8, Level 1, Full flush seamless design of size and design shown. Use for interior locations only. Do not use for stairwell doors, security doors and detention doors.

C. Heavy Duty Doors: ANSI A250.8, Level 2, Model 2 of size and design shown. Core construction types Kraft honeycomb, unitized steel grid, or vertical steel stiffeners for interior doors.

D. Smoke Doors:

1. Close top and vertical edges flush.
2. Provide seamless vertical edges.
3. Apply Steel astragal to the meeting style at the active leaf of pair of doors or double egress doors.
4. Provide clearance at head, jamb and sill as specified in NFPA 80.

E. 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.

2.3 METAL FRAMES

A. General:

1. ANSI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.
2. Frames for exterior doors: Fabricate from 1.7 mm (0.067 inch) thick galvanized steel conforming to ASTM A525.
3. Frames for labeled fire rated doors.
   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.
4. Frames for doors specified to have automatic door operators; Security doors (Type 36); service window: minimum 1.7 mm (0.067 inch) thick.
5. Knocked-down frames are not acceptable.

B. Reinforcement and Covers:

1. ANSI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.
2. Provide mortar guards securely fastened to back of hardware reinforcements except on lead-lined frames.

C. Terminated Stops: ANSI A250.8.

D. Glazed Openings:

a. Integral stop on exterior, corridor, or secure side of door.
b. Design rabbet width and depth to receive glazing material or panel shown or specified.

F. 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. Use 50 mm x 50 mm (2 inch by 2 inch) 9 mm by (3/8 inch) clip angle for lead lined frames, drilled for 9 mm (3/8 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 SHOP PAINTING

ANSI 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. Use 9 mm (3/8 inch) bolts on lead lined frames.
   2. Power actuated drive pins may be used to secure frame anchors to concrete floors.

C. Jamb Anchors:
   1. Anchors in masonry walls: Embed anchors in mortar. Fill space between frame and masonry wall with grout or mortar as walls are built.
   2. Coat frame back with a bituminous coating prior to lining of grout filling in masonry walls.
   3. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.

4. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 6 mm (1/4 inch) expansion bolts through spacers. Where 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.

E. Frames for Sound Rated Doors: Coordinate to line frames for sound rated doors with insulation.

3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

Install doors and hardware as specified in Sections Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, WOOD DOORS 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 and smoke 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.

E. Card readers: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEM

1.3 SUBMITTALS

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

B. Samples:

1. 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, louvers 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

1. 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.

1.4 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.

1.5 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, Job Site Information.
C. Label package for door opening where used.

1.6 APPLICABLE PUBLICATIONS

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.1A-11.....Architectural Wood Flush Doors
   I.S.4-09.....Water-Repellent Preservative Non-Pressure Treatment for Millwork
   I.S.6A-11.....Architectural Wood Stile and Rail Doors
   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):
   80-10.....Protection of Buildings from Exterior Fire
   252-08.....Fire Tests of Door Assemblies
D. ASTM International (ASTM):
   E90-09.....Laboratory Measurements of Airborne Sound Transmission Loss

PART 2 - PRODUCTS

2.1 FLUSH DOORS

A. General:
   1. Meet requirements of WDMA I.S.1-A, Extra Heavy Duty.
   2. Adhesive: Type II

3. Thickness: 45 mm (1-3/4 inches) unless otherwise shown or specified.

B. Face Veneer:

1. In accordance with WDMA I.S.1-A.
2. One species throughout the project unless scheduled or otherwise shown.
3. For transparent finishes: Premium Grade. rotary cut, white oak.
   a. A grade face veneer standard optional.
   b. AA grade face veneer
   c. Match face veneers for doors for uniform effect of color and grain at joints.
   d. Door edges shall be same species as door face veneer except maple may be used for stile face veneer on birch doors.
   e. In existing buildings, where doors are required to have transparent finish, use wood species and grade of face veneers to match adjacent existing doors.
4. Factory sand doors for finishing.

C. Wood for stops, louvers, muntins and moldings of flush doors required to have transparent finish:

1. Solid Wood of same species as face veneer, except maple may be used on birch doors.
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.

E. Fire rated wood doors:

1. Fire Performance Rating:
   a. “B” label, 1-1/2 hours.
   b. “C” label, 3/4 hour.
   c. Solid core label, 20 minutes
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 Rated Doors:
1. Fabricated as specified for flush wood doors with additional construction requirements to meet specified sound transmission class (STC).
2. STC Rating of the door assembly in place when tested in accordance with ASTM E90 by an independent nationally recognized acoustical testing laboratory not less than 36.
3. Accessories:

a. Frame Gaskets: Continuous closed cell sponge neoprene with stop adjusters.

b. Automatic Door Bottom Seal:

1) Steel spring operated, closed cell sponge neoprene metal mounted removable in extruded aluminum housing with a medium matte 0.1 mm (4.0 mil) thick clear Anodized finish.

2) Concealed or Surface Mounted.

2.3 PREFINISH, PREFIT OPTION

A. Flush doors may 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. Flush doors to receive transparent finish (in addition to being prefit) may be factory finished as follows:

1. WDMA I.S.1-A Section F-3 specification for System TR-4, Conversion Varnish or System TR-5, Catalyzed Vinyl.

2.4 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:

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:
   1. 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.
   2. Maximum clearance at bottom of sound rated doors, light-proofed doors, doors to operating rooms, and doors designated to be fitted with mechanical seal: 10 mm (3/8 inch).
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

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 representative.

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies access doors or panels.

1.2 RELATED WORK:

A. Lock Cylinders: Section 08 71 00, DOOR HARDWARE.

B. Access doors in acoustical ceilings: Section 09 51 00, ACOUSTICAL CEILINGS.

C. Field 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: Access doors, each type, showing construction, location and installation details.

C. Manufacturer's Literature and Data: Access doors, each type.

1.4 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-2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A1008-13.....Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy

C. American Welding Society (AWS):

D1.3-08.....Structural Welding Code Sheet Steel

D. National Fire Protection Association (NFPA):

80-10.....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 FABRICATION, GENERAL

A. Fabricate components to be straight, square, flat and in the 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.

2.2 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 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. Self-latching, with provision for fitting flush a standard screw-in type lock cylinder. Lock cylinder specified in Section 08 71 00, DOOR HARDWARE.
2. Provide latch release device operable from inside of door. Mortise case in door.

2.3 ACCESS DOORS, FLUSH PANEL:

A. Door Panel:

1. Form of 1.9 mm (0.0747 inch) thick steel sheet.
2. Reinforce to maintain flat surface.

B. Frame:
   1. Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed.
   2. Provide surface mounted units having frame flange at perimeter where installed in concrete, masonry, or gypsum board construction.
   3. Weld exposed joints in flange and grind smooth.

C. Hinge:
   1. Concealed spring hinge to allow panel to open 175 degrees.
   2. Provide removable hinge pin to allow removal of panel from frame.

D. Lock:
   1. Flush, screwdriver operated cam lock.

2.4 FINISH:

A. Provide in accordance with NAAMM AMP 500 series on exposed surfaces.

B. Steel Surfaces: Baked-on prime coat over a protective phosphate coating.

C. Stainless Steel: No. 4 for exposed surfaces.

2.5 SIZE:

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 or plaster.

B. Use fire rated doors in fire rated partitions and ceilings.

C. Use flush panels in partitions and gypsum board or plaster ceilings, except lay-in acoustical panel ceilings or upward access acoustical tile ceilings.

D. Use recessed panel access doors in the following rooms or spaces.

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.

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SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies glazed aluminum curtain wall system.

1. Thermally isolated, pressure equalized on interior.
2. Type: Stick system to include following:
   a. Glass, Glass Spandrel Panels.
   b. Integral reinforcing.
   c. Closures, trim, subsills and flashings.
   e. Fasteners, anchors, and related reinforcement.

1.2 RELATED WORK

A. Firestopping between curtain wall and structure: Section 07 84 00, FIRESTOPPING.

B. Sheet metal flashing and trim: Section 07 60 00, FLASHING AND SHEET METAL.

a. Joint sealants: Section 07 92 00, JOINT SEALANTS.

C. Aluminum windows: Section 08 51 13, ALUMINUM WINDOWS.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Approval is required of products or service of proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:
   a. Manufacturers Qualifications: Manufacturer with five (5) years continuous documented experience in design, fabrication, and installation of glazed aluminum curtain wall systems of type and size required for that project.
   b. Installer: Manufacturer approved in writing. Continuously installed glazed aluminum curtain walls systems for previous five (5) years.
   c. Manufacturer shall provide technical field representation at project site, as a minimum, at start of project, during middle, towards end of project, and during field testing of field mockup panel.
   d. Testing Laboratory: Contractor retained. Engage an AAMA accredited commercial testing laboratory to perform tests specified. Submit information regarding testing laboratory’s

facilities and qualifications of technical personnel to perform testing specified in this section.

e. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of glazed aluminum curtain wall system. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, one another, and adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

1) Do not modify intended aesthetic effects. If modifications are proposed, submit comprehensive explanatory data for review.

f. Qualification of Welders:

1) Welding shall be performed by certified welders qualified in accordance with AWS D1.2, using procedures, materials, and equipment of the type required for this work.

C. Pre-Installation Conference

1. Prior to starting installation of glazed curtain wall system schedule conference with Contracting Officer to ensure following:

a. Clear understanding of drawings and specifications.

b. Onsite inspection and acceptance of structural and pertinent structural details relating to curtain wall system.

c. Coordination of work of various trades involved in providing system. Conference shall be attended by Contractor; personnel directly responsible for installation of curtain wall system, flashing and sheet metal work, firestopping system and curtain wall manufacturer and their Technical Field Representatives. Conflicts shall be resolved and confirmed in writing.

1.4 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Product Data:

1. Manufacturer’s standard details and fabrication methods.

2. Data on finishing, components, and accessories.

3. Instructions: Submit descriptive literature, detail specifications, available performance test data and instructions for installation, and adjustments.
4. Recommendations for maintenance and cleaning of exterior surfaces.

C. Shop Drawings:
1. Show elevations of glazed curtain wall system at 1:50 (1/4 inch) scale, metal gages, details of construction, methods of anchorage, glazing details, and details of installation.
2. Submit for curtain wall system and accessories. Tentative approval of drawings shall be received before fabrication. Drawings shall indicate in detail all system parts including elevations, full size sections, framing, jointing, panels, types and thickness of metal anchorage details, flashing and coping details, field connections, weep and drainage system, finishes, sealing methods, glazing, glass sizes and details, firestopping insulation materials, and erection details.
3. Operation and Maintenance Manuals
   a. Submit cleaning and maintenance instructions.

D. Samples:
1. Submit pairs of samples of each specified color and finish on 300 mm (12-inch) long section by width of each tubular, or extruded shape section or 300 mm by 300 mm (12-inch by 12-inch) wide sections of sheet shapes.
2. Submit corner section of framing members showing fasteners, panels, glazing methods, glazing materials, and weather-stripping. Submit one sample minimum 300 mm by 300 mm (12 inches by 12 inches). In lieu of submitting separate samples for corner section, intermediate section, and panel, one composite sample incorporating all components and features listed may be submitted.
3. Where normal color variations are anticipated, include 2 or more units in set indicating extreme limits of color variations.

E. Glass:
1. Specified in Section 08 80 00, GLAZING.

F. Quality Control Submittals:
1. Design Data:
   a. Submit structural and thermal calculations for complete wall assembly. Structural calculations and design shop drawings shall

be signed and sealed by a structural engineer registered in state in which project is to be located.

2. Factory Test Reports:
   a. Test Reports: Provide certified test reports, for each of following listed tests, from a qualified independent testing laboratory showing that glazed aluminum curtain wall system assembly has been tested in accordance with specified test procedures and complies with performance characteristics as indicated by manufacturer’s testing procedures. Manufacturer shall submit appropriate testing numbers for specific tests indicated below.
      1) Deflection and structural tests.
      2) Water penetration tests.
      3) Air infiltration tests.
      4) Delamination tests.
      5) Thermal conductance tests.
      6) Submit factory tests required except that where a curtain wall system or component of similar type, size, and design as specified for this project has been previously tested within last year, under conditions specified herein, resulting test reports may be submitted in lieu of listed testing.

G. Manufacturer's Certificates:
   1. Submit Certificates of Compliance, with specification requirements, for the following:
      a. Metal extrusions.
      b. Metal accessories.
      c. Stating that aluminum has been given specified thickness of anodizing or organic coating finish.
      d. Indicating manufacturer’s and installer’s meet qualifications as specified.
      e. Submit list of equivalent size installations, for both manufacturer and installer, which have had satisfactory and efficient operation.

H. Manufacturer’s Field Reports:
   1. Submit field reports of manufacturer’s field representative observations of curtain wall installation indicating observations made during inspection at beginning of project, during middle of

installation and at conclusion of project. Indicate results of field testing of field panel, and any directions given Contractor for corrective action.

1.5 DELIVERY, STORAGE AND HANDLING

A. Refer to AAMA CW 10 for care and handling of architectural aluminum from shop to site.

B. Prior to packaging for shipment from factory, mark wall components to correspond with shop and erection drawings and their placement location and erection.

C. Prior to shipment from factory, place knocked-down lineal members in cardboard containers and cover finished surfaces of members with protective covering of adhesive paper, waterproof tape, or strippable plastic. Do not cover metal surfaces that will be in contact with sealants after installation.

D. Inspect materials delivered to site for damage; unload and store with ventilation, free from heavy dust, not subject to combustion products or sources of water, and shall permit easy access for inspection and handling. Sealing and caulking compounds, including handling, shall be in accordance with requirements of Section 07 92 00 JOINT SEALANTS.

1.6 PROJECT CONDITIONS

Field Measurements: Where glazed aluminum curtain wall systems are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying Work.

1.7 APPLICABLE PUBLICATIONS

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

B. American Architectural Manufacturers Association (AAMA):

MCWM-1-89.....Metal Curtain Wall Manual

CW 10-04.....Care and Handling of Architectural Aluminum from Shop to Site

CW 11-85.....Design Windloads for Buildings and Boundary Layer Wind Tunnel Testing

CW 13-85.....Structural Sealant Glazing Systems (A Design Guide)

CWG 1-89.....Installation of Aluminum Curtain Walls

TIR A1-04.....Sound Control for Fenestration Products

TIR A8-08.....Structural Performance of Composite Thermal Barrier Framing Systems

TIR A9-91.....Metal Curtain Wall Fasteners

TIR A11-04.....Maximum Allowable Deflection of Framing Systems for Building Cladding Components of Design Wind Loads

101/I.S.2/A440-08.....Windows, Doors and Unit Skylights

501-05.....Methods of Test for Exterior Walls

503-08.....Field Testing of Metal Storefronts, Curtain walls and Sloped Glazing Systems

2605-98.....High Performance Organic Coatings on Architectural Extrusions and Panels

1503-09.....Thermal Transmission and Condensation Resistance of Windows, Doors and Glazed Wall Sections

C. American National Standards Institute (ANSI):

Z97.1-09.....Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test

D. American Society of Civil Engineers (ASCE):

ASCE 7-10.....Minimum Design Loads for Buildings and Other Structures

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

A36/A36M-08.....Structural Steel

A123-09.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A193-10.....Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service

A307-10.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

B209-10.....Aluminum and Aluminum Alloy Sheet and Plate

B211-03.....Aluminum and Aluminum Alloy Bar, Rod, Wire

B221/B221M-08.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes

B316/B316M-10.....Aluminum and Aluminum Alloy Rivet and Cold-Heading, Wire, and Rods

C578-10.....Rigid Cellular Polystyrene Thermal Insulation

C612-10.....Mineral Fiber Block and Board Thermal Insulation

C920-11.....Elastomeric Joint Sealants

C794-10.....Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.

C1363-05.....Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

D1037-06.....Evaluating the Properties of Wood-Base Fibers and Particle Panel Materials

E84-10.....Surface Burning Characteristics of Building Materials

E90-09.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

E283-04.....Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Difference Across this Specification

E330-02(R2010).....Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

E331-00(R2009).....Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference

E413-10.....Classification for Rating Sound Insulation

E783-02(R2010).....Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

E1105-00(R2008).....Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors By Uniform or Cyclic Static Air Pressure Differences

F. American Welding Society, Inc. (AWS):

D1.2-08.....Structural Welding Code-Aluminum

G. Consumer Product Safety Commission (CPSC):

16 CFR 1201.....Architectural Glazing Standards and Related Material

H. Federal Specifications (FS):

TT-P-645B-90.....Primer, Paint, Zinc-Molybdate, Alkyd Type

I. Glass Association of North America (GANA):

2010 Edition.....GANA Glazing Manual

2008 Edition.....GANA Sealant Manual

2009 Edition.....GANA Laminated Glazing Reference Manual

2008 Edition.....Tempered Glass Engineering Standard Manual

J. Military Specifications (MIL):

MIL-C-18480.....(Rev. B) Coating Compound, Bituminous Solvent, Coal Tar Base

K. National Association of Architectural Metal Manufacturers (NAAMM):

500 Series (2006).....Metal Finishes Manual.

L. Steel Structures Painting Council (SSPC)

Paint 25-97 (2004).....Red Iron Oxide Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments

1.8 WARRANTY

A. Submit manufacturer's written warranty for materials, installation and weathertightness, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to five (5) years from date of final acceptance of project by Government.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Design Requirements:

1. Curtain Wall System: Tubular aluminum sections with thermal break condition, self supporting, supplementary support, framing, factory prefinished, vision glass, insulated metal panel, spandrel infill; related flashings, anchorage and attachment devices.
2. System Assembly: Site assembled.
3. No curtain wall framing member shall deflect, in a direction normal to plane of wall, more than 1/175 of its clear span or 20 mm (3/4 inch), whichever is less, when designed in accordance with requirements of TIR A11 and tested in accordance with ASTM E330, except that when a gypsum wallboard surface will be affected, deflection shall not exceed 1/360 of span. No framing member shall

have a permanent deformation in excess of 0.2 percent of its clear span when tested in accordance with ASTM E330 for a minimum test period of 10 seconds at 1.5 times design wind pressures indicated as part of structural drawing wind load requirements. No glass breakage, damage to fasteners, hardware or accessories shall be permitted due to deformation stated above:

a. Provide system complete with framing, mullions, trim, fasteners, anchors, accessories, concealed auxiliary members, and attachment devices for securing wall to structure as specified or indicated. Unless noted otherwise, comply with MCWM-1.
b. Curtain wall system components and/or window units shall be furnished by one manufacturer or fabricator; however, all components need not be products of same manufacturer.
c. Fully coordinate system accessories directly incorporated, and adjacent to contiguous related work and insure materials compatibility, deflection limitations, thermal movements, and clearances and tolerances as indicated or specified.
d. Provide system with adequate allowances for expansion and contraction of components and fastenings to prevent buckling damage, joint seal failure, glass breakage, undue stress on fastenings or other detrimental effects. For design purposes, base provisions for thermal movement on assumed ambient temperature range of from -18 degrees C to 49 degrees C (0 degrees F to 120 degrees F).
e. Provide wall system to accommodate tolerances in building frame and other contiguous work as indicated or specified.

B. Manufacturer’s Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of curtain walls that are similar to those indicated for this Project in material, design, and extent.

C. Performance Requirements:
1. System shall meet or exceed all performance requirements specified.
2. Curtain wall components shall have been tested in accordance with requirements below and shall meet performance requirements specified:

3. System Design: Design and size components to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall as calculated in accordance with IBC 2009 code, ASCE 7-05 Minimum Design Loads for Buildings and Other Structures. Wind design data per structural drawings 1-S01.
4. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with IBC Table 1604.5 code. Coordinate loading with Structural Drawings.
5. Water Penetration:
   a. No water penetration shall occur when wall is tested in accordance with ASTM E331 and ASTM 1105 at a differential static test pressure of 20 percent of inward acting design wind pressure as indicated on structural drawings, but not less than 479 Pa (10 psf).
   b. Make provision in wall construction for adequate drainage to outside of water leakage or condensation that occurs within outer face of wall. Leave drainage and weep openings in members and wall open during test.
6. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783
   a. Static-Air-Differential: 75 Pa (1.57 lbf/sq. ft.) minimum.
   b. Air Leakage: 0.03 L/s per sq. m (0.06 cfm/sq ft) of surface maximum.
7. Deflections Test: ASTM E330, Procedure B:
   a. No member shall deflect in a direction parallel to plane of wall, when carrying its full design load, more than an amount which will reduce edge cover or glass bite below 75 percent of design dimension. No member after deflection under full design load, shall have a clearance between itself and top of panel, glass, sash, or other part immediately below it less than 3 mm (1/8 inch); clearance between member and an operable window or door shall be minimum 1.5 mm (1/16 inch).
8. Delamination Test:
   a. Adhesively bonded metal-faced panels shall show no evidence of delamination, warpage or other deterioration or damage when subjected to the six "Accelerated Aging Cycles" specified in ASTM D1037.

9. Thermal Conductance Tests: ASTM C236.
   a. The thermal transmittance of opaque panels shall not exceed a U-value, Btu/hr/sq ft/ degree F, as required and indicated on contract drawings for exterior wall system, when tested in accordance with ASTM C236. Average calculated thermal transmittance of complete wall assembly including panels, windows, and all other components shall not exceed a U-value of 0.36.
10. Window Tests:
   a. Windows shall meet the requirements specified in Section 08 51 13 ALUMINUM WINDOWS except where requirements of this section differ, this section shall govern. Windows shall meet same requirements for deflection and structural adequacy as specified for framing members when tested in accordance with ASTM E330 except permanent deformation shall not exceed 0.4 percent; there shall be no glass breakage, and no permanent damage to fasteners, anchors, hardware, or operating devices. Windows shall have no water penetration when tested in accordance with requirements of ASTM E331.
11. Sound Attenuation Through Wall System (Exterior to Interior):
   a. STC 50, measured in accordance with ASTM E413.

2.2 MATERIALS

A. Extruded Aluminum Framing Members: ASTM B221M; 6063-T5 extruded aluminum for non-structural components or 6063-T6 extruded aluminum for structural members; temper and alloy as recommended by manufacturer.
B. Sheet Aluminum: ASTM B209M; 6065-T5 temper and alloy as recommended by manufacturer.
   1. Formed flashing and closures: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.
   2. Extruded sill members: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.
C. Steel Sections: ASTM A36M.
D. Primer: TS TT-P-645; red, for shop application and field touch-up.
E. Fasteners:
   1. For Exterior Cap Retainers: ASTM A193 B8 300 series, stainless steel screws.

2. For Framework Connections: ASTM B211M 2024-T4 aluminum, ASTM A193 B8 300 series, stainless steel, and ASTM B316 aluminum rivets, as required by connection.
3. For Anchoring Glazed Aluminum Curtain Wall to Support Structure: ASTM A307 zinc plated steel fasteners.

F. Shims: Metal or plastic.

G. Joint Sealants and Accessories:
1. In accordance with requirements specified in Section 07 92 00, JOINT SEALANTS.
2. Structural Flush Glazed Joints: High performance silicone sealant applied in accordance with manufacturer's recommendations.
3. Non-structural Flush Glazed Joints and Weather Seal Joints: Silicone sealants applied in accordance with manufacturer's recommendations.
4. Structural silicone sealant performance requirements: ASTM C920.
   a. Hardness: Type A, 30 durometer.
   b. Ultimate Tensile Strength: 1172 kPa (170 psi).
   c. Tensile at 150% Elongation: 55 kPa (80 psi).
   d. Joint Movement Capability after 14 Day Cure: +/- 50%.
   e. Peel Strength aluminum, after 21 Day Cure: 599 g/mm (34 pounds per inch).
5. Structural silicone shall not be used to support dead weight of vertical glass or panels.
6. Comply with recommendations of sealant manufacturer for specific sealant selections.
7. Provide only sealants that have been tested per ASTM C794 to exhibit adequate adhesion to samples of glass and metal equivalent to those required for project.
8. Exposed metal to metal joints: Silicone sealant selected from manufacturer’s standard colors.

H. Glazing Materials:
1. As specified under Section 08 80 00, GLAZING.
2. Glazing Gaskets:
   a. Exterior: Continuous EPDM gaskets at each glass and spandrel panel.
   b. Interior: Continuous, closed cell PVC foam sealant tape, sealed at corners.
3. Glass Sizes and Clearances:

a. Accommodate up to 25 mm (1 inch) glazing.

b. Sizes indicated are nominal. Verify actual sizes required by measuring frames. Coordinate dimensions for glass and glass holding members to meet applicable minimum clearances as recommended by glass manufacturer. Do not nip glass to remove flares or to reduce oversized dimensions. All cutting shall occur in factory.

4. Glass Setting Materials:

a. Provide head bead and drive wedge required for glass installation to suit curtain wall system in accordance with manufacture's recommendations.

L. Firestopping: Refer to Section 07 84 00, FIRESTOPPING for requirements.

2.3 FABRICATION

A. Curtain wall components shall be of materials and thickness indicated or specified. Details indicated are representative of required design and profiles. Maintain sightlines indicated on drawings. Unless specifically indicated or specified otherwise, methods of fabrication and assembly shall be at discretion of curtain wall manufacturer. Perform fitting and assembling of components in shop to maximum extent practicable. Anchorage devices shall permit adjustment in three directions. There shall be no exposed fasteners.

B. Joints: Joints exceeding +1.5 mm (+1/16") shall be mechanically fastened.

C. Ventilation and Drainage: Direct water leakage to exterior by means of concealed drainage system and weeps. Flashings and other materials used internally shall be nonstaining, noncorrosive, and nonbleeding.

D. Protection and Treatment of Metals:

1. Remove from metal surfaces lubricants used in fabrication and clean off other extraneous material before leaving shop.

2. Provide protection against galvanic action wherever dissimilar metals are in contact, except in case of aluminum in permanent contact with galvanized steel, zinc, stainless steel, or relatively small areas of white bronze. Paint contact surfaces with one coat bituminous paint conforming to MIL-C-18480 or apply appropriate caulking material or nonabsorptive, noncorrosive, and nonstaining tape or gasket between contact surfaces.

E. Metal sills and Closures: Fabricate accessories, spandrel panels, trim closures of sizes and shapes indicated from similar materials and finish as specified for wall system.

F. Concealed Interior Mullion Reinforcing: ASTM A36M steel shapes as required for strength and mullion size limitations, hot dip galvanized after fabrication in accordance with ASTM A123.

1. Concealed Back Sheets: Aluminum or galvanized steel in manufacturer's standard thickness.

2.4 PROTECTION

A. Provide protection for aluminum against galvanic action, wherever dissimilar materials are in contact, by painting contact surfaces of dissimilar material with a heavy coat of bituminous paint (complete coverage), or by separating contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on one side.

2.5 METAL FINISHES

A. In accordance with NAAMM AMP500 series.

B. Fluorocarbon Finish: AAMA 2605.

1. Color as selected by architect.

C. Shop and Touch-Up Primer for Steel Components: SSPC Paint 25 red oxide.

D. Touch-Up Primer for galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

E. Concealed Steel Items: Galvanized in accordance with ASTM A123 to 610

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of glazed curtain wall system, arrange for representative(s) of manufacturer to examine structure and substrate to determine that they are properly prepared, and ready to receive glazed curtain wall work included herein.

B. Verifying Conditions and Adjacent Surfaces: After establishment of lines and grades and prior to system installation examine supporting structural elements. Verify governing dimensions, including floor elevations, floor to floor heights, minimum clearances between curtain wall and structural frames, and other permissible dimensional tolerances in building frame.

3.2 PREPARATION

A. Take field dimensions and examine condition of substrates, supports, and other conditions under which work of this section is to be

performed to verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Contact between aluminum and dissimilar metals shall receive a protective coating of asphaltic paint for prevention of electrolytic action and corrosion.

3.3 INSTALLATION

A. Installation and erection of glazed curtain wall system and all components shall be in accordance with written directions of curtain wall manufacturer. Match profiles, sizes, and spacing indicated on approved shop drawings.

B. Bench Marks and Reference Points: Establish and permanently mark bench marks for elevations and building line offsets for alignment at convenient points on each floor level. Should any error or discrepancy be discovered in location of marks, stop erection work in that area until discrepancies have been corrected.

C. Ensure that drainage system operates properly in accord with AAMA 501 procedures.

D. Do not proceed with structural silicone work when metal temperature is below 0 degrees C (32 degrees F).

E. Isolate between aluminum and dissimilar metals with protective coating or plastic strip to prevent electrolytic corrosion.

F. Install glazed aluminum curtain wall system so as to maintain a virtually flat face cap, with no visible bowing.

G. Install entire system so that fasteners are not visible.

H. Tolerances:

1. Maximum variation from plane or location shown on approved shop drawings: 3 mm per 3600 mm (1/8 inch per 12 feet) of length up to not more than 13 mm (1/2 inch) in any total length.
2. Maximum offset from true alignment between two identical members abutting end to end in line: 0.8 mm (1/32 inch).
3. Sealant Space Between Curtain Wall Mullion and Adjacent Construction: Maximum of 19 mm (3/4 inch) and minimum of 6 mm (1/4 inch).

I. Windows:

1. Refer to Section 08 51 13, ALUMINUM WINDOWS
2. Install windows in accordance with details indicated and approved shop drawing detail drawings.

3. Seal exterior metal to metal joints between members of windows, frames, mullions, and mullion covers in accordance with requirements of Section 07 92 00, JOINT SEALANTS. Remove excess sealant.

J. Joint Sealants:

1. Joint Sealants: Shall be in accordance with requirements of Section 07 92 00, JOINT SEALANTS.
2. Surfaces to be primed and sealed shall be clean, dry to touch, free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter. Enclose joints on three sides. Clean out grooves to proper depth. Joint dimensions shall conform to approved detail drawings with a tolerance of plus 3 mm (1/8 inch). Do not apply compound unless ambient temperature is between 5 and 35 degrees C (40 and 90 degrees F). Clean out loose particles and mortar just before sealing. Remove protective coatings or coverings from surfaces in contact with sealants before applying sealants or tapes. Solvents used to remove coatings shall be of type that leave no residue on metals.
3. Match approved sample. Force compound into grooves with sufficient pressure to fill grooves solidly. Sealing compound shall be uniformly smooth and free of wrinkles and, unless indicated otherwise, shall be tooled and left sufficiently convex to result in a flush joint when dry. Do not trim edges of sealing material after joints are tooled. Mix only amount of multi-component sealant which can be installed within four hours, but at no time shall this amount exceed 19 liters (5 gallons).
4. Apply primer to masonry, concrete, wood, and other surfaces as recommended by sealant manufacturer. Do not apply primer to surfaces which will be exposed after caulking is completed.
5. Tightly pack backing in bottom of joints which are over 13 mm (1/2 inch) in depth with specified backing material to depth indicated or specified. Roll backing material of hose or rod stock into joints to prevent lengthwise stretching.
6. Install bond preventive material at back or bottom of joint cavities in which no backstop material is required, covering full width and length of joint cavities.
7. Remove compound smears from surfaces of materials adjacent to sealed joints as work progresses. Use masking tape on each side of joint

where texture of adjacent material will be difficult to clean. Remove masking tape immediately after filling joint. Scrape off fresh compound from adjacent surfaces immediately and rub clean with approved solvent. Upon completion of caulking and sealing, remove remaining smears, stains, and other soiling, and leave work in clean neat condition.

K. Glass:

1. Refer to Section 08 80 00, GLAZING, and drawing for glass types. Install in accordance with manufacturer's recommendations as modified herein.
2. Before installing glass, inspect sash and frames to receive glass for defects such as dimensional variations, glass clearances, open joints, or other conditions that will prevent satisfactory glass installation. Do not proceed with installation until defects have been corrected.
3. Clean sealing surfaces at perimeter of glass and sealing surfaces of rebates and stop beads before applying glazing compound, sealing compound, glazing tape, or gaskets. Use only approved solvents and cleaning agents recommended by compound or gasket manufacturer. All sashes shall be designed for outside glazing. Provide continuous snap in glazing beads to suit glass as specified.
4. Insulating and tempered glass, and glass of other types that exceed 100 united inches in size: Provide void space at head and jamb to allow glass to expand or move without exuding sealant. Perimeter frames and ventilator sections shall have glazing rebates providing an unobstructed glazing surface 19 mm (3/4 inch) in height. Glazing rebate surfaces must be sloped to shed water.
5. Provide adequate means to weep incidental water and condensation away from sealed edges of insulated glass units and out of wall system. Weeping of lock-strip gaskets should be in accordance with recommendation of glass manufacturer.

L. Metal Copings:

1. Refer to Section 07 60 00, FLASHING AND SHEET METAL for requirements of metal copings when they are not a part of glazed curtain wall system work.

2. Coordinate curtain wall installation with metal coping detail on contract drawings. Provide watertight seal to meet criteria set forth in this section regarding air and water penetration.

3.4 ADJUSTING

A. Adjust windows to provide a tight fit at contact points and operate easily.

3.5 CLEANING

A. Install curtain wall frame and associated metal to avoid soiling or smudging finish.

B. Clean metal surfaces promptly after installation, exercising care to avoid damage to coatings.

C. Remove excess glazing and sealant compounds, dirt, and other substances.

D. Follow recommendations of manufacturer in selection of cleaning agents. Do not use cleaning agents containing ammonia or other compounds that might damage finished metal surfaces.

E. Replace cracked, broken, and defective glass with new glass at no additional cost to Government. Just prior to final acceptance of curtain wall system clean glass surfaces on both sides, remove labels, paint spots, compounds, and other defacements, and clean metal fixed panels. Remove and replace components that cannot be cleaned successfully.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage an AAMA accredited commercial qualified independent testing and inspecting agency to perform field quality-control tests specified, and to prepare test reports: Submit information regarding testing laboratory's facilities and qualifications of technical personnel to Contracting Officer for approval.

B. Conduct field check test for water leakage on designated wall areas after erection to comply with MCWM-1. Conduct test on two wall areas, two bays wide by two stories high where directed. Conduct test and take necessary remedial action as directed by Contracting Officer.

C. Test Specimen:

1. Test specimen shall include curtain wall assembly and construction. Test chamber shall be affixed to exterior side of test specimen and test shall be conducted using positive static air pressure.

2. Test specimens shall be selected by Contracting Officer after curtain wall system has been installed in accordance with contract drawings and specification.

D. Sealant Adhesion Tests: Test installed sealant, in presence of sealant manufacturer’s field representative, in a minimum of two areas and as follows:
   1. Test structural silicone sealant according to field adhesion test method described in AAMA CW 13, "Structural Sealant Glazing Systems (A Design Guide)."
   2. Test weatherseal sealant as recommended in writing by sealant manufacturer.

E. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783 and ASTM E 283.
   1. Field air leakage testing is not required for continuous curtain wall systems.
   2. Static-Air-Pressure Differential: 75 Pa (1.57 lbf/sq. ft.) minimum.
   3. Air Leakage: 0.03 L/s per sq. m (0.06 cfm/sq. ft.) of surface maximum.

F. Water Penetration: Test glazed aluminum curtain wall system for compliance with requirements according to AAMA 503, which requires testing according to ASTM E1105.
   1. Uniform Static-Air-Pressure Difference (ASTM E 331): 20 percent of positive design wind load, but not less than 479 Pa (10 psf). No uncontrolled water shall be present.

G. Retesting:
   1. Should system fail field test, system may be modified or repaired, and retested.
   2. Should system fail second field test, system may be additionally modified or repaired, and retested.
   3. All modifications and repairs made to tested areas shall be recorded, and same modifications and repairs made to all system and adjacent construction on project.
   4. Should second test fail, Contracting Officer may require testing of additional areas of the curtain wall.

H. Rejection:

1. Failure of any of specimens to meet test requirements of third test shall be cause for rejection of wall system and adjacent construction on project.

3.7 DEMONSTRATION, TESTING, AND ACCEPTANCE

A. Instruct Owner's personnel in proper operation and maintenance of windows. Train personnel in procedures to follow in event of operational failures or malfunctions.

3.8 PROTECTION

A. After installation, protect windows, and other exposed surfaces from disfiguration, contamination, contact with harmful materials, and from other construction hazards that will interfere with their operation, or damage their appearance or finish. Protection methods shall be in accordance with recommendations of product manufacturers or of respective trade association. Remove paper or tape factory applied protection immediately after installation. Clean surfaces of mortar, plaster, paint, smears of sealants, and other foreign matter to present neat appearance and prevent fouling of operation. In addition, wash with a stiff fiber brush, soap and water, and thoroughly rinse. Where surfaces become stained or discolored, clean or restore finish in accordance with recommendations of product manufacturer or respective trade association.

- - - END - - -

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Aluminum windows of type and sizes shown, complete with hardware, related components and accessories.

B. Types:

1. Fixed

1.2 DEFINITIONS

A. Accessories: Mullions, staff beads, casings, closures, trim, moldings, panning systems, sub-sills, clips anchors, fasteners, weather-stripping and other necessary components required for fabrication and installation of window units.

B. Uncontrolled Water: Water not drained to the exterior, or water appearing on the room side of the window.

1.3 RELATED WORK

A. Glazing: Section 08 80 00, GLAZING.

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect windows from damage during handling and construction operations before, during and after installation.

B. Store windows under cover, setting upright.

C. Do not stack windows flat.

D. Do not lay building materials or equipment on windows.

1.5 QUALITY ASSURANCE

A. Approval by COR is required of products or service of proposed manufacturers and installers.

B. Approval will be based on submission of certification by Contractor that:

1. Manufacturer regularly and presently manufactures the specified windows as one of its principal products.
2. Installer has technical qualifications, experience, trained personnel and facilities to install specified items.

C. Provide each type of window produced from one source of manufacture.

D. Quality Certified Labels or certificate:

1. Architectural Aluminum Manufacturers Association, "AAMA label" affixed to each window indicating compliance with specification.

2. Certificates in lieu of label with copy of recent test report (not more than 4 years old) from an independent testing laboratory and certificate signed by window manufacturer stating that windows provided comply with specified requirements and AAMA 101/I.S.2/A440 for type of window specified.

1.6 SUBMITTAL

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

B. Shop Drawings:

1. Minimum of 1/2 full scale types of windows on project.
2. Identifying parts of window units by name and kind of metal or material, show construction, locking systems, mechanical operators, trim, installation and anchorages.
3. Include glazing details and standards for factory glazed units.

C. Manufacturer's Literature and Data:

1. Window.

D. Certificates:

1. Certificates as specified in paragraph QUALITY ASSURANCE.
2. Indicating manufacturers and installers qualifications.
3. Manufacturer's Certification that windows delivered to project are identical to windows tested.

E. Test Reports:

Copies of test reports as specified in paragraph QUALITY ASSURANCE.

F. Samples: Provide 150 mm (six-inch) length samples showing finishes, specified.

1.7 WARRANTY

Warrant windows against malfunctions due to defects in thermal breaks, hardware, materials and workmanship, subject to the terms of Article “WARRANTY OF CONSTRUCTION”, FAR clause 52.246-21, except provide 10 year warranty period.

1.8 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

90.1-07.....Energy Standard of Buildings

C. American Architectural Manufacturers Association (AAMA):
101/I.S.2/A440-11.....Windows, Doors, and Unit Skylights
505-09.....Dry Shrinkage and Composite Performance Thermal Cycling Test Procedures
2605-05.....Superior Performing Organic Coatings on Architectural Aluminum Extrusions and Panels
TIR-A8-08.....Structural Performance of Poured and Debridged Framing Systems

D. American Society for Testing and Materials (ASTM):
A653/A653M-09.....Steel Sheet, Zinc Coated (Galvanized), Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-dip Process
E 90-09.....Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

E. National Fenestration Rating Council (NFRC):
NFRC 100-10.....Determining Fenestration Product U-Factors
NFRC 200-10.....Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

F. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual

PART 2- PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions; Sheet and Plate: AAMA 101/I.S.2/A440.

B. Sheet Steel, Galvanized: ASTM A653; G90 galvanized coating.

C. Weather-strips: AAMA 101/I.S.2/A440; except leaf type weather-stripping is not permitted.

D. Fasteners: AAMA 101/I.S.2/A440. Screws, bolts, nuts, rivets and other fastening devices to be non-magnetic stainless steel.

1. Fasteners to be concealed when window is closed. Where wall thickness is less than 3 mm (0.125 inch) thick, provide backup plates or similar reinforcements for fasteners.
2. Stainless steel self tapping screws may be used to secure Venetian blind hanger clips, vent guide blocks, friction adjuster, and limit opening device.

3. Attach locking and hold-open devices to windows with concealed fasteners. Provide reinforcing plates where wall thickness is less than 3 mm (0.125 inch) thick.

F. Weather-strips: AAMA 101/I.S.2/A440.

2.2 THERMAL AND CONDENSATION PERFORMANCE

A. Condensation Resistance Factor (CRF): Minimum CRF of C 55.

B. Thermal Transmittance:

1. Maximum U value class for insulating glass windows: 50 (U=0.50).
2. Maximum U value class for dual glazed windows: 70 (U=0.70), or as required by ASHRAE 90.1.

C. Solar Heat Gain Coefficient (SHGC): SHGC shall comply with State or local energy code requirement.

2.3 FABRICATION

A. Fabrication to exceed or meet requirements of Physical Load Tests, Air Infiltration Test, and Water Resistance Test of AAMA 101/I.S.2/A440.

B. Glazing:

1. Factory or field glazing optional.
2. Glaze in accordance with Section 08 80 00, GLAZING.
3. Windows reglazable without dismantling sash framing.
4. Design rabbet to suit glass thickness and glazing method specified.
5. Glaze from interior except where not accessible.
7. Provide removable fin type glazing beads.

C. Trim:

1. Trim includes casings, closures, and panning.
2. Fabricate to shapes shown of aluminum not less than 1.6 mm (0.062 inch) thick
3. Extruded or formed sections, straight, true, and smooth on exposed surfaces.
4. Exposed external corners mitered and internal corners coped; fitted with hairline joints.
5. Reinforce 1.6 mm (0.062 inch) thick members with not less than 3 mm (1/8-inch) thick aluminum.
6. Except for strap anchors, provide reinforcing for fastening near ends and at intervals not more than 305 mm (12 inches) between ends.

7. Design to allow unrestricted expansion and contraction of members and window frames.
8. Secure to window frames with machine screws or expansion rivets.
9. Exposed screws, fasteners or pop rivets are not acceptable on exterior of the casing or trim cover system.

D. Thermal-Break Construction:
1. Manufacturer’s Standard.
2. Low conductance thermal barrier.
3. Capable of structurally holding sash in position and together.
4. All Thermal Break Assemblies (Pour & Debridge, Insulbar or others) shall be tested as per AAMA TIR A8 and AAMA 505 for Dry Shrinkage and Composite Performance.
5. Location of thermal barrier and design of window shall be such that, in closed position, outside air shall not come in direct contact with interior frame of the window.

E. Mullions: AAMA 101/I.S.2/A440.

F. Subsills and Stools:
1. Fabricate to shapes shown of not less than 2 mm (0.080 inch) thick extruded aluminum.
2. One piece full length of opening with concealed anchors.
3. Sills turned up back edge not less than 6 mm (1/4 inch). Front edge provide with drip.
4. Sill back edge behind face of window frame. Do not extend to interior surface or bridge thermal breaks.
5. Do not perforate for anchorage, clip screws, or other requirements.

2.4 FIXED WINDOWS

A. AAMA 101/I.S.2/A440; Type HC25.

B. AAMA certified product to the AAMA 101/I.S.2/A440. - 11 standard.

2.5 FINISH

A. In accordance with NAAMM AMP 500 series.

B. Finish exposed aluminum surfaces as follows:
1. Anodized Aluminum:
a. Finish in accordance with AMP 501 letters and numbers.
b. Clear anodized Finish: AA-C22A41 Medium matte, clear anodic coating, Class 1 Architectural, 0.7 mils thick.
c. Colored anodized Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte,

integrally colored coating, Class 1 Architectural, 0.7 mils thick.

1) Dyes not accepted.
2) Coated Aluminum:
3) Variation of more than 50 percent of maximum shade range approved will not be accepted in a single window or in adjacent windows and mullions on a continuous series.
   a) AMP 501 and 505.
   b) Fluorocarbon Finish: AAMA 2605, superior performing organic coating.
   c) Steel: AMP 504.
   d) Stainless steel: AMP 503.
      1. Concealed: 2B or 2D.
      2. Exposed: No. 4 unless specified otherwise.

C. Hardware: Finish hardware exposed when window is in the closed position: Match window color.

PART 3 - EXECUTION

3.1 PROTECTION (DISSIMILAR MATERIALS): AAMA 101/I.S.2/A440.

3.2 INSTALLATION, GENERAL

A. Install window units in accordance with manufacturer's specifications and recommendations for installation of window units, hardware, operators and other components of work.

B. Where type, size or spacing of fastenings for securing window accessories or equipment to building construction is not shown or specified, use expansion or toggle bolts or screws, as best suited to construction material.
   1. Provide bolts or screws minimum 6 mm (1/4-inch) in diameter.
   2. Sized and spaced to resist the tensile and shear loads imposed.
   3. Do not use exposed fasteners on exterior, except when unavoidable for application of hardware.
   4. Provide non-magnetic stainless steel Phillips flat-head machine screws for exposed fasteners, where required, or special tamper-proof fasteners.
   5. Locate fasteners to not disturb the thermal break construction of windows.

C. Set windows plumb, level, true, and in alignment; without warp or rack of frames or sash.

D. Anchor windows on four sides with anchor clips or fin trim.
   1. Do not allow anchor clips to bridge thermal breaks.
   2. Use separate clips for each side of thermal breaks.
   3. Make connections to allow for thermal and other movements.
   4. Do not allow building load to bear on windows.
   5. Use manufacturer's standard clips at corners and not over 600 mm (24 inches) on center.
   6. Where fin trim anchorage is shown build into adjacent construction, anchoring at corners and not over 600 mm (24 inches) on center.

E. Sills and Stools:
   1. Set in bed of mortar or other compound to fully support, true to line shown.
   2. Do not extend sill to inside window surface or past thermal break.
   3. Leave space for sealants at ends and to window frame unless shown otherwise.

F. Replacement Windows:
   1. Do not remove existing windows until new replacement is available, ready for immediate installation.
   2. Remove existing work carefully; avoid damage to existing work to remain.
   3. Perform all other operations as necessary to prepare openings for proper installation and operation of new units.
   4. Do not leave openings uncovered at end of working day, during precipitation or temperatures below 16 degrees C (60 degrees F.).

3.3 MULLIONS CLOSURES, TRIM, AND PANNING

A. Cut mullion full height of opening and anchor directly to window frame on each side.

B. Closures, Trim, and Panning: External corners mitered and internal corners coped, fitted with hairline, tightly closed joints.

C. Secure to concrete or solid masonry with expansion bolts, expansion rivets, split shank drive bolts, or powder actuated drive pins.

D. Toggle bolt to hollow masonry units. Screwed to wood or metal.

E. Fasten except for strap anchors, near ends and corners and at intervals not more than 300 mm (12 inches) between.

F. Seal units following installation to provide weathertight system.

3.4 ADJUST AND CLEAN

A. Adjust ventilating sash and hardware to provide tight fit at contact points, and at weather-stripping for smooth operation and weathertight closure.

B. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes.

C. Remove excess glazing and sealant compounds, dirt, and other substances.

D. Lubricate hardware and moving parts.

E. Clean glass promptly after installation of windows. Remove glazing and sealant compound, dirt and other substances.

F. Except when a window is being adjusted or tested, keep locked in the closed position during the progress of work on the project.

- - - E N D - - -

SECTION 08 51 23
STEEL WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Section Includes:

1. Steel windows, type and sizes as shown.
2. Hardware.

1.2 RELATED WORK:

A. Sealing Joints: Section 07 92 00, JOINT SEALANTS.

B. Glazing: Section 08 80 00, GLAZING.

C. Finish Color: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY CONTROL

A. QUALIFICATIONS:

1. Approval is required of products or service of proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:
   a. Manufacturer who regularly and presently, manufactures and installs steel window units and related accessories as one of its principal products.
   b. Accessories required for windows shall be manufacturer's standard or those of other manufacturers regularly engaged in making window accessories and acceptable to window manufacturer.
      1) Items shall be of materials which shall be compatible with balance of window unit material, and construction shall be that which shall give desired functional service.
2. Installer: Approved in writing by manufacturer.

1.4 PERFORMANCE REQUIREMENTS:

A. Air Infiltration Test at Weather-stripped Ventilators:

1. Operable windows: Provided with weather-stripping, such that when tested in closed and locked position in accordance with ASTM E283 before leaving factory, air infiltration shall not exceed 2.06 cubic meter per hour per meter (0.37 cubic foot per minute per foot) of crack length when subjected to a pressure differential across the window of 300 Pa (6.24 psf) equivalent to a wind velocity of 50 miles per hour. Fixed window areas: Maximum air infiltration shall not exceed 0.34 cubic meter per hour per meter (0.06 cubic foot per minute per square foot) of fixed window area.

B. Water Penetration Test at Weather-stripped Ventilators:
   1. Operable windows: Provided with weather-stripping, such that when tested in closed and locked position in accordance with ASTM E331 no water penetrates for 15 minutes when a window is subjected to a rate of flow of 5 gal./hr./sq. ft. with a pressure differential across the window at 160 Pa (2.86 psf).

1.5 SUBMITTALS:

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish following:
B. Product Data: Furnish for each type of window required, including:
   1. Construction details and fabrication methods.
   2. Profiles and dimensions of individual components.
   3. Data on hardware, including sweep lock, keeper, lift handles, accessories, and finishes.
   4. Recommendations for maintenance and cleaning of window surfaces.
C. Shop Drawings: Furnish for each type window included in project.
   1. Layout and installation details, including anchors, support framing and sheet metal trim members.
   2. Elevations of continuous work at 1:50 (1/4 inch) scale and typical window unit elevations at 1:20 (3/4 inch) scale.
   3. Full-size section details of typical composite members, including reinforcement.
   4. Hardware.
   5. Accessories.
   6. Glazing details.
   7. Color charts for standard finishes and sealants.
D. Samples:
   1. Typical sash corner.
   2. Typical muntin section.
   3. For Initial Color Selection: Submit samples of each specified finish on 300 mm (12 inch) long sections of window members.
   4. Hardware.
E. Quality Control Submittals:
   1. Test Reports: Window manufacturer provide certified test report from a qualified independent testing laboratory engaged in testing windows to verify that his steel window assembly has been tested in accordance with specified test procedures and products comply with

these minimum test performance characteristics indicated. Test reports shall have been made within current year.

2. Manufacturer's Certificates:
   a. Stating steel members have been given specified thickness of prime coat and/or organic coating finish.
   b. Indicating manufacturer’s and installer’s meet qualifications as specified.

1.6 DELIVERY, STORAGE AND HANDLING:

A. Comply with applicable recommendations of Steel Window Institute.

B. Deliver steel window units and related components in manufacturer’s original, unopened protective packaging labeled for identification with manufacturer's name and brand and contents. Use padded blankets or other approved protective wrapping for glass, decorative metal work, and other exposed elements.
   1. Do not deliver steel window units until work is ready for their installation.
   2. Inspect components for damage upon delivery. Do not install steel window units with dimples or dents. Remove and replace damaged components at no additional cost.

C. Storage: Store steel window units and related components, in positions necessary to prevent twisting, in weathertight and dry storage facility in their original shipping containers with protective wrapping or packaging securely in place, in accordance with manufacturers written instructions.

D. Protect finish from damage from handling, weather and construction operations before, during and after installation.

1.7 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):
   Z97.1-09.....Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.

C. American Society for Testing and Materials (ASTM):
   A123-09.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B633-07.....Electrodeposited Coatings of Zinc on Iron and Steel

C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material.

D2287-96(2010).....Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds

E283-04.....Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across Specimen.

E331-00(R2009).....Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

D. National Fire Protection Association:

NFPA 80-10.....Standard for Fire Doors and Windows.

E. Steel Structures Painting Council (SSPC):

SSPC-SP1.....Solvent Cleaning.

SSPC-SP8.....Pickling.

1.8 WARRANTY:

Warranty: Submit written warranty, in accordance with General Condition requirements except that warranty period shall be extended to include five (5) years.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Materials:

1. Frame: Formed from 2.3 mm (12 gauge) galvanized sheet steel.
2. Heavy Intermediate Ventilators: Manufactured from solid hot rolled steel shapes.
   a. Sections made from new billet steel with flanges rolled integral at mill.
   b. Ventilator sections shall have glazing rebates providing an unobstructed glazing surface of at least 16 mm (5/8 inch) in height.
   c. Glazing rebate surfaces must be perpendicular to web or stem of section. Applied glazing rebate extensions and tapered rebate surfaces are not acceptable.

3. Mullions and Transom Bars: Mullions and transom barts shall withstand a uniform wind load of 960 Pa (20 psf) of window area without deflecting more than 1/175 of span.
4. Weather-stripping: Pile weather-strip.
5. Hardware shall be as follows:
   a. Fastener: Standard bronze sweep lock.
   b. Pulls: U.S. 25D: Polished White Bronze.
   C. Balance Arm: Spiral and extension spring sash balance.
6. Paint Finishes:
   a. Prime Coat: After fabrication, steel windows, fins, mullions, cover plates and associated parts shall be cleaned, properly treated, prime painted with manufacturer’s standard prime paint.
   b. Factory Finish: After fabrication, for type of factory finish selected, steel windows and associated components shall be cleaned, and given following treatments:
      1) Pretreatment: Zinc phosphate treated.
      2) Primer: Manufacturer’s special epoxy primer and oven cured.
      3) Finish Coat: Manufacturer’s standard color coat finish and oven cured.
      4) Color: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.
         a) Color of finish coat is specified in Section 09 06 00, SCHEDULE FOR FINISHES.
         B) Touch-up abraded surfaces with enamel as specified for factory finish coat, except that it shall be Class A (Air-Drying), same as original.
   c. Zinc Coated Optional Finish: All steel except screens, shall be cleaned and:
      1) Hot dip galvanized (ASTM A123) and/or Electrodeposited (ASTM B633) or equivalent standards.
      2) Zinc coated, phosphate treated and prime painted.
      3) Zinc coated, phosphate treated, prime painted and factory finished in color as selected, from manufacturer’s standard colors.
      4) Use galvanize repair compound where galvanized surfaces need field or shop repair. Apply compound in accordance with manufacturer's printed directions.
7. Glass and Glazing: As specified in Section 08 80 00, GLAZING.

a. Windows shall be factory glazed prior to delivery to project site.
b. Do not provide weep holes through glazed areas.

8. Accessories:
   a. Fit and install each screen so as to cover windows individually and be free from interference with window hardware without sacrificing protection against insects.
   b. Anchor clips and mullions necessary for installation of windows and hardware for operation of ventilators, including fasteners required for attaching such items to window shall be provided by window manufacturer.
   c. Screws, shields, plugs or other fastenings into building construction shall be in accordance with manufacturer’s recommendations.
   d. Window Cleaner’s Bolts: Provide window cleaner’s bolts of standard design, complying with governing regulations and ANSI A39.1. Fabricate bolts of stainless steel or bronze. Reinforce window units or mullions to receive bolts, and provide additional anchorage of units at locations of bolts.
   e. Extension Pole Operators: Provide one pole operator and pole hanger for every room that has operable windows more than 1800 mm (6 feet) above floor. Fabricate pole of tubular anodized aluminum with rubber cap at lower end and standard push-pull hook to match hardware design at top end. Provide sufficient length for window operation without reaching more than 1500 mm (5 feet) above floor.

2.2 FABRICATION:

A. General: Fabricate steel windows in accordance with approved shop drawings. Form sections in one piece, straight, true and smooth. Prior to fabrication, all hot rolled steel sections shall be cleaned by shot blasting. Provide drips and weep holes in accordance with manufacturer’s standard practice.
   1. Attachment of manufacturer's metal nameplates, shall not be permitted on any window surface.

B. Frame: Members shall be modified channel shapes. Corners of frame and ventilators shall be mitered or coped then solidly welded. Head and jamb members shall have integral screen-stops. Integrally roll

continuous flange at jambs and heads to form a caulking stop between facing and backing masonry. Exposed and contact surfaces shall be finished smooth, flush, with adjacent surfaces.

C. Sills: Sills shall have stepped rebates to receive lower sash bottom rail, which shall be kept clear of sill wash. Sills shall not be perforated at any point in their full length. Weld strap anchors to underside of sill, or screw to tapped lugs welded thereto.

D. Sash: Rails shall be tubular. Stiles may be tubular or modified channel shape. Stiles and rails shall be formed in one piece from single strips. Make sash rebates minimum 15 mm (19/32 inch). Make interior horizontal top surfaces of both meeting rails flat and in same plane. Meeting rails shall have tight contact with wedge blocks at jambs when sash is closed. Cope, end-lap and weld all corners of sash.

E. Muntins: Steel tee muntin sections shall be tenoned and welded to perimeter frame. Muntin intersections shall be slotted and cross notched.

F. Glazing: Design windows for interior glazing. Provide continuous removable snap-in metal glazing beads to suit specified glazing.

G. Mullions: Provide manufacturer's standard or a structural shape mullion at multiple unit openings. Make mullions full height of opening and embed them to minimum depth of 125 mm (5 inches) into sill, or securely anchor at head and sill with zinc-coated sheet steel extensions, standard bent-clips or offset shapes of 1.7 mm (14 gauge) zinc-coated steel.

H. If windows and interior metal window trim are installed as complete units, mullions may be anchored at head by means of 5 mm (3/16 inch) steel plate clip bolted to mullion and welded to lintel, and supported at sill with 2.3 mm (12 gauge) zinc-coated steel bent clips welded to mullion.

I. Closures: Miter or cope closure corners and fit with tightly closed joints. Secure closures to window frames with non-corrosive machine screws or expansion rivets, and to masonry with fasteners specified.

J. Reinforcing: Reinforce window frames for attachment of screens, screen hardware or travel-limit lug. Full or limited length reinforcing plates shall be welded to back of frames, and shall be 3 mm (1/8 inch) thick and of sufficient width to securely hold fasteners.

K. Welding: Dress all exposed welds and joints, flush and smooth.

L. Fasteners for Anchoring: Where type, size or spacing of fasteners for securing windows and accessories to building construction is not shown or specified, use expansion or toggle bolts or screws, recommended by manufacturer for construction material adjacent to window units. Bolts or screws: Minimum 6 mm (1/4 inch) diameter and spaced not over 600 mm (24 inches) on centers.
   1. Expansion shield and bolt assemblies shall provide holding power beyond tensile and shearing strength of bolt.
   2. Power actuated drive pins may be used for securing anchors to concrete if recommended by manufacturer.

2.3 INTERIOR METAL WINDOW TRIM:

A. Form window trim of zinc-coated sheet steel. Use 1.2 mm (18 gauge) for heads and jambs, 2.33 mm (12 gauge) for stools and 1.0 mm (20 gauge) for moldings.
   1. Make trim of welded assembly with hairline mitered corners, dressed flush and smooth. Trim to be used for plaster key, shall have flanges expanded or perforated and provided with attachments for anchorage. Slightly round exposed edges. Coat back side of trim to masonry. Make provisions for fastening of metal plastering base.

2.4 WEATHERSTRIPS:

Install weather-strips, as standard with manufacturer, at head, jambs, sill, and meeting rails of sash and of impost. Weather-strip shall be applied to both integral weather-strip grooves of aluminum weather-strip adapter. Secure weather-strip adapter to frame surface.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Window openings shall conform with details, dimensions and tolerances shown on window manufacturer’s approved shop drawings.
B. Conditions which may adversely affect window installation shall be brought to Contractors attention, for repair, prior to commencement of window installation. Do not proceed with window installation until unsatisfactory conditions have been corrected.
C. Washdown of adjacent masonry shall be completed prior to erection of windows to prevent damage to window finish by cleaning materials.

3.2 INSTALLATION

A. General:

1. Windows specified under this section shall be installed by experienced personnel as approved by window manufacturer.

B. Install windows in strict accordance with approved shop drawings.

1. Set units plumb, level and true to line, without warp or rack of frames.
2. Anchor units securely to surrounding construction with a minimum of three adjustable, asphalt coated or galvanized steel anchors with approved fasteners in accordance with manufacturer’s recommendations.
3. Exterior joints between sash, trim and mullions shall be properly sealed watertight with an approved sealant as specified in Section 07 92 00, JOINT SEALANTS, and neatly pointed. Finished work shall have weathertight joints.

C. Protect window equipment during construction.

D. Upon complete installation of all windows and accessories, and before acceptance of work, adjust all movable sash and operating mechanism for free and easy operation, and defects of any nature.

E. Furnish certificate, signed by both contractor and window manufacturer, stating that installation of windows was done by installers approved by manufacturer of windows.

3.3 PROTECTION:

A. Protect windows from damage until final inspection and acceptance.

- - - E N D - - -

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, Section 08 71 13, AUTOMATIC DOOR OPERATORS

C. Painting: Section 09 91 00, PAINTING.

D. Electrical: Division 26, ELECTRICAL.

E. Fire Detection: Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 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, except as otherwise specified:

1. Mortise locksets.
2. Hinges for hollow metal and wood doors.
3. Surface applied overhead door closers.
4. Exit devices.

1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of FAR Clause 52.246-21, 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.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

1.6 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23. Submit 2 final copies of the final approved schedules to VAMC Locksmith as record copies (VISN Locksmith if the VAMC does not have a locksmith).

B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation

C. Samples and Manufacturers' Literature:
   1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.
   2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates 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.

1.7 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 COR for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in COR’s office until all other similar items have been installed in project, at which time the COR will deliver items on file to Contractor for installation in predetermined locations on the project.

1.8 INSTRUCTIONS

A. Hardware Set: Hardware requirements for each door are indicated on drawings by symbols. 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.	Glendale, CA
Glynn Johnson	Glynn Johnson Co.	Chicago, IL
LCN	LCN Closers	Princeton, IL
Firemark	Rixon-Firemark Co.	Chicago, IL
Hager	Hager Hinge Company	Saint Louis, MO
Stanley	The Stanley Works	New Britain, CT
Trimco	Triangle Brass Mfg. Co.	Los Angeles, CA
Unican	Simplex Security Systems	Collinsville, CT
Von Duprin	Von Duprin Hardware Co.	Indianapolis, IN

Zero	Zero Weather Stripping Co.	New York, NY

C. Keying: All cylinders shall be keyed into existing Corbin Russwin 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 6 pin type. Keying information shall be furnished at a later date by the COR.

1.10 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

A156.12-05 .....Interconnected Locks and Latches

A156.13-05.....Mortise Locks and Latches Series 1000

A156.14-07 .....Sliding and Folding Door Hardware

A156.15-06.....Release Devices-Closer Holder, Electromagnetic and Electromechanical

A156.16-08.....Auxiliary Hardware

A156.17-04 .....Self-Closing Hinges and Pivots

A156.18-06.....Materials and Finishes

A156.20-06 .....Strap 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

A156.25-07 .....Electrified Locking Devices

A156.26-06.....Continuous Hinges

A156.28-07 .....Master Keying Systems

A156.29-07 .....Exit Locks and Alarms

A156.30-03 .....High Security Cylinders

A156.31-07 .....Electric 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. The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Exterior Doors: Type A8112 for doors 900 mm (3 feet) wide or less and Type A8111 for doors over 900 mm (3 feet) wide. Hinges for exterior outswing doors shall have non-removable pins. Hinges for exterior fire-rated doors shall be of stainless steel material.
2. Interior Doors: Type A8112 for doors 900 mm (3 feet) wide or less and Type A8111 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.
3. Automatic doors hung on butts, provide Type A2111 for aluminum doors, and Type A8111 for other doors.

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, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves; joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.
1. Manufacturers:
a. Bommer Industries, Inc.
b. Hager Companies.
c. McKinney Products Company; an ASSA ABLOY Group company.
d. Pemko Manufacturing Co.
e. Select Products Limited.
f. Zero International.

2.3 DOOR CLOSING DEVICES

A. Closing devices shall be products of one manufacturer for each type specified.

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 ½" (38mm) minimum piston diameter.

2.5 DOOR STOPS

A. Conform to ANSI A156.16.

B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For concrete, masonry or quarry tile construction, use lead expansion shields for mounting door stops.

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 door stops on doors where combination closer magnetic holders are specified.

E. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).

2.6 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.

2.7 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 six 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 to match building standard. Lever handle shall be fabricated from wrought stainless steel, unless specified otherwise. No substitute lever design or material shall be accepted. All locks and latchsets shall be furnished with curved lip strike and wrought box. Lock function F02 shall be furnished with key plates similar to Russwin's No. A70. Furnish armored fronts for all mortise locks.
   2. Cylindrical Lock and Latch Sets: levers shall meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets shall be series 4000 Grade I. Knobs for series 4000 lock and latch sets shall have 57 mm (2-1/4 inch) diameters. 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.

2.8 PUSH-BUTTON COMBINATION LOCKS

A. ANSI/BHMA A156.13, Grade 1. Battery operated pushbutton entry.

B. Construction: Heavy duty mortise lock housing conforming to ANSI/BHMA A156.13, Grade 1. Lever handles and operating components in compliance with the UFAS and the ADA Accessibility Guidelines. Match lever handles of locks and latchsets on adjacent doors.

C. Special Features: Key override to permit a master keyed security system and a pushbutton security code activated passage feature to allow access without using the entry code.

2.9 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: 1500 lbf (6672 N.
3. Inductive Kickback Peak Voltage: Not more than 0 V.
4. Residual Magnetism: Not more than 0 lbf (0 N) to separate door from magnet.

2.10 ELECTRIC STRIKES

A. ANSI/ BHMA A156.31 Grade 1.

B. General: Use fail-secure electric strikes at fire-rated doors.

2.11 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

B. Psychiatric keys shall be cut so that first two bittings closest to the key shoulder are shallow to provide greater strength at point of greatest torque.

2.12 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING

A. Conform to ANSI Standard A156.6.

B. Provide protective plates and door edging 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. Armor plates for doors are listed under Article "Hardware Sets". Armor plates shall be thickness as noted in the hardware set, 875 mm (35 inches) high and 38 mm (1-1/2 inches) less than width of doors, except on pairs of metal doors. Provide armor plates beveled on all 4 edges (B4E). Plates on pairs of metal doors shall be 25 mm (1 inch) less than width of each door. Where top of intermediate rail of door is less than 875 mm (35 inches) from door bottom, extend armor plates to within 13 mm (1/2 inch) of top of intermediate rail. On doors equipped with panic devices, extend armor plates to within 13 mm (1/2 inch) of panic bolt push bar.

2.13 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.

2.14 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).

2.15 FLUSH BOLTS (AUTOMATIC)

A. Conform to ANSI A156.3. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch and unlatch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flushbolt. Face plates for dustproof strike shall be rectangular and not less than 38 mm by 90 mm (1-1/2 by 3-1/2 inches).

B. At interior doors, provide auto flush bolts less bottom bolt, unless otherwise specified, except at wood pairs with fire-rating greater than 20 minutes; provide fire pins as required by auto flush bolt and door fire labels.

2.16 DOOR PULLS WITH PLATES

A. Conform to ANSI A156.6. Pull Type J401, 152 mm (6 inches) high by 19 mm (3/4 inches) diameter with plate Type J302, 90 mm by 350 mm (3-1/2 inches by 14 inches), unless otherwise specified. Provide pull with projection of 70 mm (2 3/4 inches) and a clearance of 51 mm (2 inches). Cut plates of door pull plate for cylinders, or turn pieces where required.

2.17 PUSH PLATES

A. Conform to ANSI A156.6. Metal, Type J302, 200 mm (8 inches) wide by 350 mm (14 inches) high. Provide metal Type J302 plates 100 mm (4 inches wide by 350 mm (14 inches) high) where push plates are specified for doors with stiles less than 200 mm (8 inches) wide. Cut plates for cylinders, and turn pieces where required.

2.18 COMBINATION PUSH AND PULL PLATES

A. Conform to ANSI 156.6. Type J303, stainless steel 3 mm (1/8 inch) thick, 80 mm (3-1/3 inches) wide by 800 mm (16 inches) high), top and bottom edges shall be rounded. Secure plates to wood doors with 38 mm (1-1/2 inch) long No. 12 wood screws. Cut plates for turn pieces, and cylinders where required. Pull shall be mounted down.

2.19 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.

2.20 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 fame face.

2.21 AUTOMATIC DOOR BOTTOM SEAL AND RUBBER GASKET FOR LIGHT PROOF OR SOUND CONTROL DOORS

A. Conform to ANSI A156.22. Provide mortise or under-door type, except where not practical. For mortise automatic door bottoms, provide type specific for door construction (wood or metal).

2.22 WEATHERSTRIPS (FOR EXTERIOR DOORS)

A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774m^3/s/m).

2.23 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. 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.

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." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges --exterior doors: 626.
2. Hinges --interior doors: 652.
3. Pivots: Match door trim.
4. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
5. Thresholds: Mill finish aluminum.

7. Other primed steel hardware: 652.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces.

2.31 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	Base Metal
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware and submit locations to VA COR for approval.

B. Hardware Heights from Finished Floor:

1. Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
2. Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
3. Deadlocks centerline of strike 1219 mm (48 inches).
4. Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
5. Centerline of door pulls to be 1016 mm (40 inches).
6. Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
7. Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
8. Centerline of deadlock strike to be 840 mm (33 inches) when used with push-pull latch.
9. Locate other hardware at standard commercial heights.

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 COR. 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 COR 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 Medical Center Director along with the bitting list. Also a copy of the invoice shall be sent to the COR 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 COR that upon completion, installer has visited the Project and has accomplished the following:
   1. Re-adjust hardware.
   2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
   3. Identify items that have deteriorated or failed.
   4. Submit written report identifying problems.

3.4 DEMONSTRATION

A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of COR 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.

B. Hardware Consultant working on a project will be responsible for providing additional information regarding these hardware sets. The numbers shown in the following sets come from BHMA standards.

C Manufacturer’s Abbreviations:

1. MK - McKinney

2. RO - Rockwood
3. YA - Yale
4. AD - Adams Rite
5. RU - Corbin Russwin
6. HS - HES
7. RF - Rixson
8. NO - Norton
9. BM - Besam
10. PE - Pemko
11. 00 - Other
12. SA - Sargent
13. SU - Securitron
14. LU - Lund Equipment Co., Inc.

Hardware Schedule

Set: 1.0

Doors: 2B301D

6 Hinge (heavy weight)	T4A3786	US26D	MK
2 Fire Rated Surf Vert Rod	7170F LBR EO	630	YA
2 Door Closer	PR7500	689	NO
2 Kickplate	K1050 10" high 4BE	US32D	RO
2 Electromagnetic Holder	998 x Voltage as Required	689	RF
1 Gasketing	S88D (Head & Jambs)		PE
1 Astragal	S771C x Door Height		PE

Set: 2.0

Doors: 2D301C, 2D301D, 2D301F, 2D301G

2 Continuous Hinge	MCK-12HD EPT x LAR	CL	MK
2 Exit Device (surface vertical rod, classroom)	7175 LBR B P AU626F	630	YA
2 Cylinder	Cylinder as required.	626	RU
2 Door Operator	6020 D	689	NO
2 Silencer	608		RO
2 eLynx Frame Harness	QC-C1500P		MK
2 eLynx Door Harness	QC-C*** (Length / Type as Required)		MK
2 Electric Power Transfer	EL-CEPT		SU
1 Door Switch	533		NO
1 Controller	782		YA

Notes: CARD READER BY OTHERS. PRESENTING AUTHORIZED CREDENTIAL TO CARD READER WILL UNLOCK EXIT DEVICE AND ACTIVATE OPERATOR ALLOWING ACCESS. PUSHING INTERIOR DOOR SWITCH WILL UNLOCK EXIT DEVICE AND ACTIVATE OPERATOR ALLOWING EGRESS. EGRESS IS BY EXIT DEVICE. EMERGENCY ACCESS BY KEY.

Set: 3.0

Doors: 2B301B, 2B301F, 2D301

2 Continuous Hinge	MCK-12HD EPT x LAR	CL	MK
2 Fire Rated Surf Vert Rod	7170F LBR B P AU626F	630	YA
2 Cylinder	Cylinder as required.	626	RU
2 Door Operator	6020 D	689	NO
2 Silencer	608		RO
2 eLynx Frame Harness	QC-C1500P		MK
2 eLynx Door Harness	QC-C*** (Length / Type as Required)		MK
2 Electric Power Transfer	EL-CEPT		SU

1 Door Switch	533		NO
1 Controller	782		YA

Notes: CARD READER BY OTHERS. PRESENTING AUTHORIZED CREDENTIAL TO CARD READER WILL UNLOCK EXIT DEVICE AND ACTIVATE OPERATOR ALLOWING ACCESS. PUSHING INTERIOR DOOR SWITCH WILL UNLOCK EXIT DEVICE AND ACTIVATE OPERATOR ALLOWING EGRESS. EGRESS IS BY EXIT DEVICE. EMERGENCY ACCESS BY KEY.

Set: 4.0

Doors: 2B307, 2B308, 2B314, 2B321, 2B322, 2B232, 2D309

6 Hinge	TA2714 NRP	US26D	MK
2 Manual Flush Bolt	555/557	US26D	RO
1 Dust Proof Strike	570	US26D	RO
1 Mortise Lock (storeroom)	AUR 8805FL LC	626	YA
2 Surface Overhead Holder/Stop	10-046	630	RF
2 Silencer	608		RO

Set: 5.0

Doors: 2B300, 2B301L

3 Hinge	TA2714	US26D	MK
1 Mortise Lock (passage)	AUR 8801FL	626	YA
1 Door Stop	409	US32D	RO
3 Silencer	608		RO

Set: 6.0

Doors: 2B306B, 2B302, 2D301E

3 Hinge	TA2714	US26D	MK
1 Mortise Lock (privacy)	AUR 8802FL IND	626	YA
1 Door Closer	7500	689	NO

1 Kickplate	K1050 10" high 4BE	US32D	RO
1 Door Stop	409	US32D	RO
3 Silencer	608		RO

Set: 7.0

Doors: 2B300A, 2B300B, 2B300C, 2B317, 2B319, 2D268

3 Hinge	TA2714	US26D	MK
1 Mortise Lock (privacy)	AUR 8802FL IND	626	YA
1 Door Closer	7500	689	NO
1 Kickplate	K1050 10" high 4BE	US32D	RO
1 Door Stop	409	US32D	RO
1 Gasketing	S88D (Head & Jambs)		PE

Set: 8.0

Doors:

3 Hinge (heavy weight)	T4A3786	US26D	MK
1 Push Plate	70C	US32D	RO
1 Pull Plate	110x70C	US32D	RO
1 Door Closer	7500	689	NO
1 Kickplate	K1050 10" high 4BE	US32D	RO
1 Door Stop	409	US32D	RO
3 Silencer	608		RO

Set: 9.0

Doors: 2B311

2 Hinge	TA2714	US26D	MK
1 Hinge	TA2714 QC-8	US26D	MK

1 Electrified Mortise Lock	AUR 8891FL LC REX	626	YA
1 Cylinder	Cylinder as required.	626	RU
1 Door Stop	409	US32D	RO
1 Gasketing	S88D (Head & Jambs)		PE
1 Door Bottom	411ANBL		PE
1 eLynx Frame Harness	QC-C1500P		MK
1 eLynx Door Harness	QC-C*** (Length / Type as Required)		MK
1 Power Supply	BPS (size & type as required)		SU
1 Coat Hook	RM801	US26D	RO

Notes: CARD READER BY OTHERS. PRESENTING AUTHORIZED CREDENTIAL TO CARD READER WILL UNLOCK EXTERIOR TRIM ALLOWING ACCESS. EGRESS IS BY INSIDE LEVER. EMERGENCY ACCESS BY KEY.

Set: 10.0

Doors: 2B309A, 2B309C

2 Hinge	TA2714	US26D	MK
1 Hinge	TA2714 QC-8	US26D	MK
1 Electrified Mortise Lock	AUR 8891FL LC REX	626	YA
1 Cylinder	Cylinder as required.	626	RU
1 Surface Overhead Stop	10-036	630	RF
3 Silencer	608		RO
1 eLynx Frame Harness	QC-C1500P		MK
1 eLynx Door Harness	QC-C*** (Length / Type as Required)		MK
1 Power Supply	BPS (size & type as required)		SU

Notes: CARD READER BY OTHERS. PRESENTING AUTHORIZED CREDENTIAL TO CARD READER WILL UNLOCK EXTERIOR TRIM ALLOWING ACCESS. EGRESS IS BY INSIDE LEVER. EMERGENCY ACCESS BY KEY.

Set: 11.0

Doors: 2B306A, 2D306

2 Hinge	TA2714	US26D	MK
1 Hinge	TA2714 QC-8	US26D	MK
1 Electrified Mortise Lock	AUR 8891FL LC REX	626	YA
1 Cylinder	Cylinder as required.	626	RU
1 Door Closer	7500	689	NO
1 Kickplate	K1050 10" high 4BE	US32D	RO
1 Door Stop	409	US32D	RO
1 Door Bottom	411ANBL		PE
3 Silencer	608		RO
1 eLynx Frame Harness	QC-C1500P		MK
1 eLynx Door Harness	QC-C*** (Length / Type as Required)		MK
1 Power Supply	BPS (size & type as required)		SU

Notes: CARD READER BY OTHERS. PRESENTING AUTHORIZED CREDENTIAL TO CARD READER WILL UNLOCK EXTERIOR TRIM ALLOWING ACCESS. EGRESS IS BY INSIDE LEVER. EMERGENCY ACCESS BY KEY.

Set: 12.0

Doors: 2B304, 2B312, 2B318, 2B320C, 2D303, 2D304, 2D307, 2D308

2 Hinge	TA2714	US26D	MK
1 Hinge	TA2714 QC-8	US26D	MK
1 Electrified Mortise Lock	AUR 8891FL LC REX	626	YA
1 Cylinder	Cylinder as required.	626	RU
1 Door Closer	7500	689	NO
1 Kickplate	K1050 10" high 4BE	US32D	RO
1 Door Stop	409	US32D	RO
1 Gasketing	S88D (Head & Jambs)		PE

1 Door Bottom	411ANBL	PE
1 eLynx Frame Harness	QC-C1500P	MK
1 eLynx Door Harness	QC-C*** (Length / Type as Required)	MK
1 Power Supply	BPS (size & type as required)	SU

Notes: CARD READER BY OTHERS. PRESENTING AUTHORIZED CREDENTIAL TO CARD READER WILL UNLOCK EXTERIOR TRIM ALLOWING ACCESS. EGRESS IS BY INSIDE LEVER. EMERGENCY ACCESS BY KEY.

Set: 13.0

Doors: 2B310B, 2B320A, 2B320B

1 Automatic Slider	By Others	BM

Notes: ALL HARDWARE BY AUTOMATIC SLIDING DOOR MANUFACTURER.

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SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies equipment, controls and accessories for automatic operation of swing and sliding doors.

1.2 RELATED WORK

A. Door hardware; Section 08 71 00, DOOR HARDWARE.

B. Section 28 13 00, ACCESS CONTROL.

C. Glass and glazing of doors and frames; Section 08 80 00, GLAZING.

D. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.

E. Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 QUALITY ASSURANCE

A. Automatic 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 type of automatic door equipment shall be used throughout the project.

C. Equipment installer shall have specialized experience and shall be approved by the manufacturer.

1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of the "Warranty of Construction", Article of GENERAL CONDITIONS, except that the Warranty period shall be two years in lieu of one year.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish 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:

1. Showing location of controls and safety devices in relationship to each automatically operated door.

2. Showing layout, profiles, product components, including anchorage, accessories, as applicable.
3. Submit templates, wiring diagrams, fabrication details and other information to coordinate the proper installation of the automatic door operators.

D. Submit in writing to COR that items listed in Article 1.3 are in compliance.

1.7 DESIGN CRITERIA

A. As a minimum automatic door equipment shall comply with the requirements of BHMA 156.10. Except as otherwise noted on drawings, provide operators which will move the doors from the fully closed to fully opened position in seven seconds maximum time interval, when speed adjustment is at maximum setting.

B. Equipment: Conforming to UL 325. Provide key operated power disconnect wall switch for each door installation.

C. Electrical Wiring, Connections and Equipment: Provide all motor, starter, controls, associated devices, and interconnecting wiring required for the installation. 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. Builders Hardware Manufacturers Association, Inc. (BHMA):
A156.10-05.....Power Operated Pedestrian Doors (BHMA 1601)

C. National Fire Protection Association (NFPA):
101-2012.....Life Safety Code

D. Underwriters Laboratory (UL):
325-10.....Door, Drapery, Gate, Louver, and Window Operators and Systems

1.9 DELIVERY AND STORAGE

A. Delivery shall be in factory’s original, unopened, undamaged container with identification labels attached.

PART 2 - PRODUCTS

2.1 SWING DOOR OPERATORS

A. General: Swing door operators shall be of institutional type, door panel size 600 mm to 1250 mm (2'-0" to 5'-0") width, weight not to

exceed 300 kg (600 pounds), electric operated for overhead mounting within the header or transom. Furnish metal mounting supports, brackets and other accessories necessary for the installation of operators at the head of the door frames. The motor on automatic door operator shall be provided with an interlock so that the motor will not operate when doors are electrically locked from opening.

B. Operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall be capable of recycling doors instantaneously to full open position from any point in the closing cycle when control switch is activated. Operators shall, when automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.

C. Operator, enclosed in housing, 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, or controlled by hydraulic closer in electro-hydraulic operators. System shall operate as manual door control in event of power failure. Opening and closing speeds shall be adjustable:

1. Operator Housing: Housing shall be a minimum of 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems. All structural sections shall have a minimum thickness of 3.2 mm (0.125 inch) and be fabricated of a minimum of 6063-T5 aluminum alloy.
2. Power Operator: Completely assembled and sealed unit which shall include gear drive transmission, mechanical spring and bearings, all located in aluminum case and filled with special lubricant for extreme temperature conditions. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.
3. Connecting hardware shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing. 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. All connecting harnesses shall have interlocking plugs.

2.2 MICROPRCESSOR CONTROLS

A. The system shall include a multi-function microprocessor control providing adjustable hold open time (1-30 seconds), LED indications for sensor input signals and operator status and power assist close options. Control shall be capable of receiving activation signals from any device with normally open dry contact output. 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 stops the opening direction of the door if an obstruction is sensed. The motor shall include a recycle feature that reopens the door if an obstruction is sensed at any point during the closing cycle. The control shall include a standard three position key switch with functions for ON, OFF, and HOLD OPEN, mounted on operator enclosure.

2.3 SLIDING DOOR OPERATORS

A. General: Sliding doors shall have electric operators, conforming to BHMA A156.10 and the following requirements as applicable. Assembly shall be single or bi-parting sliding doors as shown on drawings.

B. Door Operation: Doors shall be opened by electric motor pulling door from closed to open position and shall stop door by electrically reducing voltage and stalling door against mechanical stop. System shall permit manual control of door in event of power failure. Opening and closing speeds shall be adjustable. In compliance with NFPA-101, all door panels shall allow "breakout" to the full open position to provide instant egress at any point in the door’s movement.

C. Operators: Completely assembled and sealed electromechanical operating unit, all located in cast aluminum housing and filled with special lubricant for extreme conditions. Attached to transmission system shall be a minimum 1/8 Hp "DC" shunt-wound permanent magnet motor with sealed ball bearings. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement. Operators shall have adjustable

opening and closing cycle. Housing shall be minimum 6063T-5 alloy aluminum not less than .005 mm (125 inch) minimum thickness, 150 mm by 200 mm (6 inch wide by 8 inch high).

D. Sliding Door Hardware Guide Rollers, Door Carrier: Top door carriers shall ride on steel or delrin rollers incorporating sealed bearings with each door having two support rollers and one anti-rise roller. Each roller shall have a minimum of 9 mm (3/8-inch) of vertical adjustment with positive mechanical locks. Each door shall also include two urethane covered oil impregnated bearing bottom rollers attached with 5 mm (3/16-inch) thick formed steel guide brackets. Each door carrier supporting a door leaf shall include a vertical steel reinforcing member to prevent sagging when door is swung under breakaway conditions. All carbon steel brackets and fittings shall be plated for corrosion resistance.

E. Locking Hardware: Do not provide any locking hardware at interior doors not requiring physical security. Provide doors with flush concealed vertical rod panic hardware integrated into the doors where physical security is required and free egress is required at all times. Provide doors with manufacturers' standard hookbolt lock (keyed both sides) where physical security is required and free egress is not required at all times. At doors with access control devices (card readers, etc.), provide doors with electronic deadbolt locking to prevent the doors from manually sliding open.

F. Door Closers: Provide all breakout or swing-out panels with door closers concealed in the top rail of the door.

2.4 POWER UNITS

Each power unit shall be self-contained, electric operated and independent of the door operator. Capacity and size of power circuits shall be in accordance with automatic door operator manufacturer's specifications and Division 26 – ELECTRICAL.

2.5 DOOR CONTROLS

A. Opening and closing actions of doors shall be actuated by controls and safety devices specified, and conform to ANSI 156.10. Controls shall cause doors to open instantly when control device is actuated; hold

doors in open positions; then, cause doors to close, unless safety device or reactivated control interrupts operation.

B. Manual Controls:

1. Push Plate Wall Switch: Recess type, stainless steel push plate minimum 100 mm by 100 mm (four-inch by four-inch), with 13 mm (1/2-inch) high letters "To Operate Door--Push" engraved on face of plate.

C. Motion Detector: The motion detector may be surface mounted or concealed, to provide a signal to actuate the door operator, and monitor the immediate zone, to detect intrusion by persons, carts or similar objects. The zone which the detector monitors shall be 1500 mm (five feet) deep and 1500 mm (five feet) across, plus or minus 150 mm (six inches) on all dimensions. The maximum response time shall be no less than 25 milliseconds. Unit shall be designed to operate on 24 volts AC. The control shall not be affected by cleaning material, solvents, dust, dirt and outdoor weather conditions.

2.6 SAFETY DEVICES

A. General: Area over which doors swing or slide shall be a safety section and anyone standing in path of door's movement shall be protected by a safety device.

B. Each swing door shall have installed on the pull side a presence sensor to detect any person standing in the door swing path and prevent the door from opening.

C. Time delay switches shall be adjustable between 3 to 60 seconds and shall control closing cycle of doors.

D. Decals with sign "In" or "Do Not Enter" shall be installed on both faces of each door where shown.

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 o£ traffic (pedestrians, carts, stretchers and wheelchairs) 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 COR.

3.2 INSTRUCTIONS

A. Following the installation and final adjustments of the door operators, the installer shall fully instruct VA personnel for 2 hours on the operating, servicing and safety requirements for the swing and sliding automatic door operators.

B. Coordinate instruction to VA personnel with VA COR.

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SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

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. Sound resistant doors: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, and Section 08 14 00, WOOD DOORS.
2. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.
3. Section 08 51 13, ALUMINUM WINDOWS
4. Section 08 44 13, GLAZED ALUMINUM CURTAIN WALLS.

1.3 LABELS

A. Temporary labels:

1. Provide temporary label on each light of glass 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 approved by COR.

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.
   c. Organic coated glass.

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 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 applicable code.
2. Test in accordance with ASTM E 1300.
3. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.

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.
   4. Certificate that blast resistant glass meets the requirements of UFC4-010-01.

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. Glazing cushion.
   4. Sealing compound.

E. Samples:
   1. Size: 150 mm by 150 mm (6 inches by 6 inches).
   2. Tinted glass.
   3. Reflective 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.

D. Protect laminated security glazing units against face and edge damage during entire sequence of fabrication, handling, and delivery to installation location. Provide protective covering on exposed faces of glazing plastics, and mark inside as "INTERIOR FACE" or "PROTECTED FACE":

1. Treat security glazing as fragile merchandise, and packaged and shipped in export wood cases with width end in upright position and blocked together in a mass. Storage and handling shall comply with Manufacturer's directions and as required to prevent edge damage or other damage to glazing resulting from effects of moisture, condensation, temperature changes, direct exposure to sun, other environmental conditions, and contact with chemical solvents.
2. Protect sealed-air-space insulating glazing units from exposure to abnormal pressure changes, as could result from substantial changes in altitude during delivery by air freight. Provide temporary breather tubes which do not nullify applicable warranties on hermetic seals.
3. Temporary protections: The glass front and polycarbonate back of glazing shall be temporarily protected with compatible, peelable, heat-resistant film which will be peeled for inspections and re-applied and finally removed after doors and windows are installed at destination. Since many adhesives will attack polycarbonate, the film used on exposed polycarbonate surfaces shall be approved and applied by manufacturer.
4. Edge protection: To cushion and protect glass clad, polycarbonate, and Noviflex edges from contamination or foreign matter, the four edges shall be sealed the depth of glazing with continuous standard-thickness Santoprene tape. Alternatively, continuous channel shaped extrusion of Santoprene shall be used, with flanges extending into face sides of glazing.

5. Protect "Constant Temperature" units including every unit where glass sheet is directly laminated to or directly sealed with metal-tube type spacer bar to polycarbonate sheet, from exposures to ambient temperatures outside the range of 16 to 24 C, during the fabricating, handling, shipping, storing, installation, and subsequent protection of glazing.

1.7 PROJECT CONDITIONS

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. Insulating glass units to remain sealed for 10 years.
   2. Laminated glass units to remain laminated for 5 years.
   3. Polycarbonate to remain clear and ultraviolet light stabilized for 5 years.
   4. Insulating plastic to not have more than 6 percent decrease in light transmission and be ultraviolet light stabilized for 10 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):

Z97.1-09.....Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test.

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

C542-05.....Lock-Strip Gaskets

C716-06.....Installing Lock-Strip Gaskets and Infill Glazing Materials.

C794-10.....Adhesion-in-Peel of Elastomeric Joint Sealants

C864-05.....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers

C920-11.....Elastomeric Joint Sealants

C964-07.....Standard Guide for Lock-Strip Gasket Glazing

C1036-06.....Flat Glass

C1048-12.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.

C1376-10.....Pyrolytic and Vacuum Deposition Coatings on Flat Glass

D635-10.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastic in a Horizontal Position

D4802-10.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet

E84-10.....Surface Burning Characteristics of Building Materials

E119-10.....Standard Test Methods for Fire Test of Building Construction and Material

E2190-10.....Insulating Glass Unit

D. Commercial Item Description (CID):

A-A-59502.....Plastic Sheet, Polycarbonate

E. Code of Federal Regulations (CFR):

16 CFR 1201 - Safety Standard for Architectural Glazing Materials; 2010

F. National Fire Protection Association (NFPA):

80-13.....Fire Doors and Windows.

252-12.....Standard Method of Fire Test of Door Assemblies

257-12.....Standard on Fire Test for Window and Glass Block Assemblies

G. National Fenestration Rating Council (NFRC)

H. Safety Glazing Certification Council (SGCC) 2012:

Certified Products Directory (Issued Semi-Annually).

I. Underwriters Laboratories, Inc. (UL):

752-11.....Bullet-Resisting Equipment.

J. Unified Facilities Criteria (UFC):

4-010-01-2012.....DOD Minimum Antiterrorism Standards for Buildings

K. Glass Association of North America (GANA):

Glazing Manual (Latest Edition)

Sealant Manual (2009)

L. American Society of Civil Engineers (ASCE):

ASCE 7-10.....Wind Load Provisions

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. Thickness, 6 mm (1/4 inch) as indicated.
3. Coordinate color/tint/coating to accommodate required security monitoring.

C. Tinted Heat reflective and low emissivity coated glass:

1. ASTM C1036, Type I, Class 2, Quality q3.
2. Color: as selected by COR and Architect.
3. Thickness as indicated.

2.2 HEAT-TREATED GLASS

A. Clear Heat Strengthened Glass:

1. ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch) as indicated.

B. Clear Tempered Glass:

1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch) as indicated.

2.3 COATED GLASS

A. Spandrel Glass:

1. ASTM C1048, Kind HS, Condition B, Type I.
2. Thickness as indicated.

B. Reflective Tempered Glass:

1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with reflective metallic coating, having nominal values of 25 percent day light, 30 percent solar, and 7.9 percent ultraviolet transmittance within three percent plus or minus.
2. Thickness as indicated.

C. Low-E Tempered Glass:

1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with low emissivity pyrolytic coating having an E of 0.15.
2. Apply coating to #4 surface of insulating glass units.
3. Thickness, 4.8 mm (3/16 inch).

2.4 INSULATING GLASS UNITS

A. Provide factory fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space and comply with ASTM E2190.

B. Assemble units using glass types specified:

C. Sealed Edge Units (SEU):

1. Insulating Glass Unit Makeup
   a. Outboard Lite
      1. Glass type: float, tempered (FT) tinted outboard lite
      2. Glass Tint: selected by COR and Architect
      3. Nominal Thickness: ¼”
      4. Glass Strength: Tempered
      5. Coating Orientation: N/A
   b. Spacer
      1. Nominal Thickness: ½”
      2. Gas Fill: Air
   c. Inboard Lite
      1. Glass Type: float, clear, tempered (FT) tinted
      2. Glass Tint: selected by COR and Architect
      3. Nominal Thickness: ¼”
      4. Glass Strength: Tempered
      5. Coating Orientation: sprayed custom color opacifier on #4 surface
2. Performance Characteristics (Center of Glass)
   a. Visible Transmittance: VLT = 35%
   b. Summer U-factor: 0.27
   c. Winter U-factor (U-value): 0.29
   d. Shading Coefficient (SC): 0.29
   e. Solar Heat Gain Coefficient (SHGC): 0.25
3. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.
4. Glass heat-treated by horizontal (roller hearth) process with inherent roller wave distortion parallel to the bottom edge of the glass as installed when specified.

2.5 FIRE RESISTANT GLASS WITHOUT WIRE MESH

A. Type 1 (Transparent float glass), Class 1 (Clear).

B. Fire-protective glass products used to protect against smoke and flames only shall be rated for 20 minutes as required by local building code and shall be tested in accordance with NFPA 252 (Standard Methods of Fire Tests of Door Assemblies) and NFPA 257 (Standard on Fire Test for Window and Glass Block Assemblies)

C. Fire-resistive products used to protect against smoke, flame, and the transmission of radiant heat shall be rated for 90 minutes and shall be tested in accordance with NFPA 252, NFPA 257, and ASTM E119 (Standard Test Methods for Fire Tests of Building Construction and Materials).

D. Fire-rated glass or glass assembly shall be classified by Underwriters Laboratory (UL), Intertek Testing Services- Warnock Hersey (ITS-WHI) or any other OSHA certified testing laboratory. All glass shall bear a permanent mark of classification in accordance with local building code.

E. Maximum size is per the manufacturer’s test agency listing for doors, transoms, side lights, borrowed lights, and windows.

F. Where safety glazing is required by local building code, fire-rated glass shall be tested in accordance with CPSC 16 CFR 1201 Category I or II and bear a permanent mark of classification.

   1. Category I products are limited to 0.84 m2 – 9 ft2 and tested to no less than 203 Nm-150 ft-lbs impact loading.
   2. Category II products are greater than 0.84 m^2 – 9 ft^2 and tested to no less than 542 Nm-400 ft-lbs impact loading. Category II products can be used in lieu of Category I products.

2.6 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: ASTM C864:
1. Channel shape having a 6 mm (1/4 inch) internal depth.
2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
3. Lengths: One to 25 to 76 mm (one to three inches).
4. 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.

F. 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.

G. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as indicated.

H. Glazing Sealants: ASTM C920, silicone neutral cure:
1. Type S.
2. Class 25
3. Grade NS.
4. Shore A hardness of 25 to 30 Durometer.

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. Glaze in compliance with glass manufacturer's written instructions.
2. When glazing gaskets are used, they shall be of sufficient size and depth to cover glass seal or metal channel frame completely.
3. Do not use putty or glazing compounds.

4. Do not grind, nip, cut, or otherwise alter edges and corners of fused glass units after shipping from factory.
5. Install with tape or gunnable sealant in wood sash.

H. Fire Resistant Glass:
1. Glaze in accordance with UL design requirements.

3.4 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.
B. Place setting blocks at ¼ 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 - EXTERIOR BUTT GLAZED METHOD (SEALANT ONLY)

A. Temporarily brace glass in position for duration of glazing process. Mask edges of glass at adjoining glass edges and between glass edges and framing members.
B. Temporarily secure a small diameter non-adhering foamed rod on back side of joint.
C. Apply sealant to open side of joint in continuous operation; thoroughly fill the joint without displacing the foam rod. Tool the sealant surface smooth to concave profile.
D. Permit sealant to cure then remove foam backer rod. Apply sealant to opposite side, tool smooth to concave profile.
E. Remove masking tape.

3.6 REPLACEMENT AND CLEANING

A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by COR.
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

Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

- - - E N D - - -

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies steel stud wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, metal strapping, fasteners, and accessories for the screw attachment of gypsum board.

1.2 RELATED WORK

A. Wood Blocking: Section 06 10 00, ROUGH CARPENTRY.

B. Ceiling suspension systems for acoustical tile or panels: Section 09 51 00, ACOUSTICAL CEILINGS.

1.3 TERMINOLOGY

A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists.

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

In accordance with the requirements of ASTM C754.

1.6 APPLICABLE PUBLICATIONS

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

B. American Society For Testing And Materials (ASTM)

A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire

A653/653M-11.....Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

C11-10.....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

C645-09.....Non-Structural Steel Framing Members

C754-11.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

C841-03(R2008).....Installation of Interior Lathing and Furring

C954-10.....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

E580-11.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint.

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G-60 minimum, per ASTM 123.

2.2 STEEL STUDS AND RUNNERS (TRACK)

A. ASTM C645, modified for thickness specified and sizes and shown.

1. Use ASTM A653/A653M 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.
5. Steel Jamb-Strut.

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 FLAT STRAP AND BACKING PLATE

A. In lieu of wood blocking, contractor may utilize 8" wide galvanized steel sheet for blocking and bracing in length indicated, or if not indicated, of sufficient length to support the intended object.

B. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm) unless indicated otherwise on Drawings.

2.5 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.

2.6 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.

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. indicated on drawings.

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.

C. 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.

D. Install full-length steel E studs over shaft wall line at intersections, corners, hinged door jambs, columns, and both sides of closure panels.

E. 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.
   1. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.
B. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.
C. Existing concrete construction exposed or concrete on steel decking:
   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.
D. Steel decking without concrete topping:
   1. Do not fasten to steel decking 0.76 mm (0.0299-inch) or thinner.
   2. Toggle bolt to decking 0.9 mm (0.0359-inch) or thicker only where anchorage to steel framing is not possible.
E. 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.
F. 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.)

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SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

A. Acoustical batt insulation: Section 07 21 13, THERMAL INSULATION.

B. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

C. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

1.3 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.

1.4 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Cornerbead and edge trim.
2. Finishing materials.
3. 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 shaft wall assembly.
4. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

D. Test Results:

1. Fire rating test, each fire rating required for each assembly.
2. Sound rating test.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

In accordance with the requirements of ASTM C840.

1.7 APPLICABLE PUBLICATIONS

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

B. American Society for Testing And Materials (ASTM):

C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems

C475-02.....Joint Compound and Joint Tape for Finishing Gypsum Board

C840-08.....Application and Finishing of Gypsum Board

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

C1177-06.....Glass Mat Gypsum Substrate for Use as Sheathing

C1658-06.....Glass Mat Gypsum Panels

C1396-06.....Gypsum Board

E84-08.....Surface Burning Characteristics of Building Materials

C. Underwriters Laboratories Inc. (UL):

Latest Edition.....Fire Resistance Directory

D. Inchcape Testing Services (ITS):

Latest Editions.....Certification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise. Shall contain a minimum of 20 percent recycled gypsum.

B. Coreboard or Shaft Wall Liner Panels.
   1. ASTM C1396, Type X.
   2. ASTM C1658: Glass Mat Gypsum Panels,
   3. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick with paper faces treated to resist moisture.
C. Water Resistant Gypsum Backing Board: ASTM C620, Type X, 16 mm (5/8 inch) thick.
D. Gypsum cores shall contain maximum percentage of post industrial recycled gypsum content available in the area (a minimum of 95 percent post industrial recycled gypsum content). Paper facings shall contain 100 percent post-consumer recycled paper content.

2.2 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.

2.3 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.

2.4 FINISHING MATERIALS AND LAMINATING ADHESIVE

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).

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 shaft wall 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 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. Use gypsum boards in maximum practical lengths to minimize number of end joints.

E. Bring gypsum board into contact, but do not force into place.

F. Ceilings:

1. For single-ply construction, use perpendicular application.

2. For two-ply assembles:

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.

G. 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. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
6. 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.
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. Use one system throughout.
   b. Locate where wall lengths exceed 9000 mm (30 feet) and which do not contain openings with control joints or change in direction such as a column enclosure.
   c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.

H. 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.

I. Electrical and Telecommunications Boxes:
1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

J. 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 INSTALLING GYPSUM SHEATHING

A. Install in accordance with ASTM C840, except as otherwise specified or shown.
B. Use screws of sufficient length to secure sheathing to framing.
C. Space screws 9 mm (3/8 inch) from ends and edges of sheathing and 200 mm (8 inches) on center. Space screws a maximum of 200 mm (8 inches) on center on intermediate framing members.

D. Apply 600 mm by 2400 mm (2 foot by 8 foot) sheathing boards horizontally with tongue edge up.

E. Apply 1200 mm by 2400 mm or 2700 mm (4 ft. by 8 ft. or 9 foot) gypsum sheathing boards vertically with edges over framing.

3.4 FINISHING OF GYPSUM BOARD

A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for al finished areas 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 smoke barrier, fire rated and sound rated. 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.

3.5 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 smoke tight construction, 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

This section specifies Porcelain tile, edge-protection, transition profiles for floors and movement joints.

1.2 RELATED WORK

A. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.

B. Metal and resilient edge strips at joints with new resilient flooring: Section 09 65 19, RESILIENT TILE FLOORING. See also Typical Flooring Transition details as indicated in Construction Documents

1.3 SUBMITTALS

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

B. Samples:

1. Base tile, each type, each color, each size.
2. Porcelain tile, each type, color, patterns and size.
3. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.

C. Product Data:

1. Porcelain tile, marked to show each type, size, and shape required.
2. Chemical resistant mortar and grout.
3. Dry-set, Latex-Portland cement mortar.
4. Elastomeric membrane.
5. Reinforcing tape.
6. Leveling compound.
7. Fasteners.
8. Divider Strips.
9. Movement joints.

D. Certification:

1. Master grade, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
   a. Chemical resistant mortar and grout.
   b. Elastomeric membrane and bond coat.
   c. Reinforcing tape.

d. Leveling compound.

E. Shop Drawings:

1. Indicate tile layout, patterns, color arrangement, perimeter conditions and junctions with dissimilar material and setting details.

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 MAINTENANCE DATA

A. Include cleaning methods, cleaning solutions recommended; stain removal methods, and polishes and waxes approved for use by tile and installation manufacturers.

B. Store material to prevent damage or contamination.

1.6 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

A108.1A-05.....Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar

A108.1B-05.....Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with dry-Set or latex-Portland Cement Mortar

A108.1C-05.....Contractors Option; Installation of Ceramic Tile in the Wet-Set method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar

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

A108.11-05.....Interior Installation of Cementitious Backer Units

A108.13-05.....Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone

A118.1-05.....Dry-Set Portland Cement Mortar

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

A118.5-05.....Chemical Resistant Furan Mortars and Grouts for Tile Installation

A118.6-05.....Standard Cement Grouts for Tile Installation

A118.9-05.....Cementitious Backer Units

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):

A185-07.....Steel Welded Wire Fabric, Plain, for Concrete Reinforcing

C241-90 (R2005).....Abrasion Resistance of Stone Subjected to Foot Traffic

C627-93(R2007).....Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester

C954-07.....Steel Drill Screws for the Application of Gypsum Board on Metal Plaster Base to Steel Studs from 0.033 in (0.84 mm) to 0.112 in (2.84 mm) in thickness

C979-05.....Pigments for Integrally Colored Concrete

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Panel Products

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

C1178/C1178M-06.....Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel

D4397-02.....Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

D. Marble Institute of America (MIA): Design Manual III-2007

E. Tile Council of North America, Inc. (TCNA):

2008.....Handbook for Ceramic Tile Installation

PART 2 - PRODUCTS

2.1 TILE

A. Comply with ANSI A137.1, Standard Grade, except as modified:

1. Inspection procedures listed under the Appendix of ANSI A137.1.
2. Abrasion Resistance Classification:
   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.
   b. Porcelain Paver Tile: Matte surface finish
4. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and

package so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

B. Porcelain Paver Tile: Nominal 8 mm (5/16 inch) thick and Nominal 9.525mm (3/8 inch), cushion edges.

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 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. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
   e. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
   f. 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).
   g. Provide cove and bullnose shapes where shown and required to complete tile work.

2.2 EDGE-PROTECTION AND TRANSITION PROFILES FOR FLOORS

A. L-shaped profile with 1/8 inch (3.2 mm) wide visible surface integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

B. Material and Finish: AE – Satin Anodized Aluminum

C. Height: Coordinate with tile specification.

2.3 MOVEMENT JOINTS AND COVE-SHAPED PROFILES

A. Description: profile with integrated trapezoid-perforated anchoring legs, connected by a 3/4 inch (20mm) or 1 3/16 inch (30 mm) wide replaceable thermoplastic rubber movement zone, which together form the visible surface.

B. Anchoring Leg Material: A Aluminum

C. Movement Zone Color: To match flooring material; submit samples to architect.

C. Height: As required.

D. Width: As required.

2.4 FASTENERS

A. Washers: Galvanized steel, 13 mm (1/2 inch) minimum diameter.

2.5 SETTING MATERIALS OR BOND COATS

A. Conform to TCNA Handbook for Ceramic Tile Installation.

B. Latex-Portland Cement Mortar: ANSI A118.4.

1. For wall, Interior applications; provide non-sagging, latex-Portland cement mortar complying with ANSI A118.4.

   a. MAPEI, Ultralite Mortar, or approved equal.

2. For Floor Interior applications; Prepackaged Dry-Mortar Mix: Factory-prepared mixture of Portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

   a. MAPEI, Keralastic System; consisting of: Kerabond, dry-set mortar and Keralastic, latex admixture, or approved equal.

C. Organic Adhesives: ANSI A136.1, Type 1.

   a. MAPEI, Type 1 Tile Adhesive, or approved equal.

D. Chemical-Resistant Bond Coat:

1. Epoxy Resin Type: ANSI A118.3.

   a. MAPEI, Kerapoxy 410, or approved equal.

E. Elastomeric Waterproofing Membrane:

1. ANSI A118.10.
2. Liquid applied, waterproofing/Crack isolation membrane:

   a. MAPEI, Mapelastic 400, or approved equal.

3. Waterproofing membrane to be installed in all Showers.

2.6 GROUTING MATERIALS

A. Chemical-Resistant Grout:

1. Pre-mixed Urethane and quartz based grout.
2. Unsanded grout mixture for joints 3.2 mm (1/8 inch) and narrower.
3. Sanded grout mixture for joints 3.2 mm (1/8 inch) and wider.

2.7 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).

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.

1. Self-leveling underlayment: Mapei, Ultraplan M20 Plus, or approved equal.
2. Patching: Mapei, Quickpatch, or approved equal.

2.8 WATER

Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.9 CLEANING COMPOUNDS

A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

B. Materials containing acid or caustic material not acceptable.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain 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 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. 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 except finish smooth for elastomeric waterproofing.
      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.

B. Cleavage Membrane:
   1. Install polythene sheet as cleavage membrane in depressed slab when waterproof membrane is not scheduled or indicated.
   2. Turn up at edge of depressed floor slab to top of floor.

C. 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 METAL DIVIDER STRIPS

A. Install metal divider strips in floor joints between ceramic 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:

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.

3.5 PORCELAIN TILE - GENERAL

A. Comply with ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" applicable to methods of installation.

B. Comply with TCNA Installation Guidelines

C. Setting Beds or Bond Coats:

1. Where recessed or depressed floor slabs are filled with Portland cement mortar bed, set ceramic mosaic floor tile in either Portland cement paste over plastic mortar bed or latex-Portland cement mortar over cured mortar bed except as specified otherwise, ANSI A108-1C, TCNA System F121-02 or F111-02.
2. Set floor tile in elastomeric bond coat over elastomeric membrane ANSI 108. 13, TCNA System F122 where scheduled.
3. Set trim shapes in same material specified for setting adjoining tile.

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. Joints:
   a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.
   b. Make joints in Paver tile, porcelain type; maximum 3.175 mm (1/8” inch) wide.
10. 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.
    b. Tile installed with epoxy grouts.
    c. Tile wall installations composed of tiles 304.8 by 304.8 mm (12 by 12 inches or larger.

3.6 CERAMIC TILE INSTALLED WITH PORTLAND CEMENT MORTAR

A. Mortar Mixes for Floor, Wall and Base Tile (including Showers): ANSI A108.1.except specified otherwise.

B. Installing Wall and Base Tile: ANSI A108.1, except specified otherwise.

C. Installing Floor Tile: ANSI A108.1, except as specified otherwise. Slope mortar beds to floor drains a minimum of 1 in 100 (1/8 inch per foot).

3.7 THIN SET CERAMIC TILE INSTALLED WITH DRY-SET PORTLAND CEMENT AND LATEX-PORTLAND CEMENT MORTAR

A. Installation of Tile: ANSI A108.5, except as specified otherwise.

8. Slope tile work to drains not less than 1 in 100 (1/8 inch per foot).

3.9 THIN SET CERAMIC TILE INSTALLED WITH CHEMICAL-RESISTANT BOND COAT

A. Epoxy Resin Type: Install tile in accordance with Installation of Tile with Epoxy Mortar; ANSI A108.6.

3.9 CERAMIC TILE INSTALLED WITH ELASTOMERIC BOND COAT

A. Surface Preparation: Prepare surfaces as specified in paragraph 3.3.

B. Installation of Elastomeric Membrane: ANSI A108.13 and TCA F122-02.

1. Prime surfaces, where required, in accordance with manufacturer's instructions.
2. Install first coat of membrane material in accordance with manufacturer's instructions, in thickness of 0.75 to 1.3 mm (30 to 50 mils).
3. Extend material over flashing rings of drains and turn up vertical surfaces not less than 100 mm (four inches) above finish floor surface.
4. When material has set, recoat areas with a second coat of elastomeric membrane material for a total thickness of 1.3 to 1.9 mm (50 to 75 mils).
5. After curing test for leaks with 25 mm (one inch) of water for 24 hours.

C. Installation of Tile in Elastomeric Membrane:

1. Spread no more material than can be covered with tile before material starts to set.
2. Apply tile in second coat of elastomeric membrane material in accordance with the coating manufacturer's instructions in lieu at aggregate surfacing specified in ASTM C1127. Do not install top coat over tile.

3.10 GROUTING

A. Grout Type and Location:

1. Grout for floor tile to be pre-mixed urethane grout.

B. Workmanship:

1. Install and cure grout in accordance with the applicable standard.

3.11 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, tub, service sink, at toe of base, and where shown not less than 6 mm (1/4 inch) deep.

3.12 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 urethane and tile set in elastomeric bond coat as recommended by the manufacturer of the grout and bond coat.

3.13 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.

3.14 TESTING FINISH FLOOR

A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.

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SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1- GENERAL

1.1 DESCRIPTION

A. Metal ceiling suspension system for acoustical ceilings.

B. Acoustical units.

1.2 RELATED WORK

A. Color, pattern, and location of each type of acoustical unit: Refer to Drawing 1-IF-03.

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, including units specified to match existing.
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-09.....Zinc-coated (Galvanized) Carbon Steel Wire

A653/A653M-11.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process

C423-09.....Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

C634-11.....Standard Terminology Relating to Environmental Acoustics

C635-13.....Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

C636-13.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

E84-13.....Surface Burning Characteristics of Building Materials

E119-12.....Fire Tests of Building Construction and Materials

E413-10.....Classification for Rating Sound Insulation.

E580-11.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint

E1264-08e1.....Classification for Acoustical Ceiling Products

C. International Organization for Standardization (ISO)

ISO 14644-1.....Classification of Air Cleanliness

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 22 mm (7/8 inch) with not less than 8 mm (5/16 inch) panel bearing surface.

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 unless specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.

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. Use anchors or inserts to support twice the loads imposed by hangers attached thereto.

B. Hanger Inserts:

1. Fabricate inserts from steel, zinc-coated (galvanized after fabrication).
2. Nailing type option for wood forms:
   a. Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
   b. Lower portion provided with not less than 8 mm (5/16 inch) hole to permit attachment of hangers.
3. Flush ceiling insert type:
   a. Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.
   b. Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 inch) high over top of wire.
   c. Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.

C. 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: (ACT-1)

1. Ceiling Tile shall meet minimum 37% bio-based content in accordance with USDA Bio-Preferred Product requirements.
2. ASTM E1264, weighing 3.6 kg/m^2 (3/4 psf) minimum for mineral fiber panels or tile.
3. Class A Flame Spread: ASTM 84
4. Minimum NRC (Noise Reduction Coefficient): 0.55 unless specified otherwise: ASTM C423.
5. Minimum CAC (Ceiling Attenuation Class): 40-44 range unless specified otherwise: ASTM E413.
6. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.75 on the exposed surfaces.
7. Lay-in panels: Sizes as shown, with square edges.

B. Soiled Room (ACT-2)

1. Ceiling Tile shall meet minimum 50% recycled content in accordance with FTC guidelines.
2. ASTM E1264, weighing 1.02 psf minimum for mineral fiber panels or tile. Type IV, Form 2, Pattern G H.
3. Class A Flame Spread: ASTM 84
4. Minimum NRC (Noise Reduction Coefficient): 0.55 unless specified otherwise: ASTM C423.
5. Minimum CAC (Ceiling Attenuation Class): 35: ASTM E413.
6. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.79 on the exposed surfaces.

7. Surface Finish - Soil resistant polyester film.
8. Lay-in panels: Sizes as shown, with square edges. Provide border panels.

2.7 ACCESS IDENTIFICATION

A. Markers:
   1. Use colored markers with pressure sensitive adhesive on one side.
   2. Make colored markers of paper of 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.

E. Existing ceiling:

1. Where extension of existing ceilings occur, match existing.
2. Where acoustical units are salvaged and reinstalled or joined, use salvaged units within a space. Do not mix new and salvaged units within a space which results in contrast between old and new acoustic units.
3. Comply with specifications for new acoustical units for new units required to match appearance of existing units.

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 m^2 (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:
   a. Install hanger inserts and wire loops required for support of hanger wire in concrete forms before concrete is placed. Install hanger wires with looped ends through steel deck if steel deck does not have attachment device.
   b. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger wire. Install in sides of concrete beams or joists at mid height.

2. Steel:
   a. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels for attachment of hanger wires.
      (1) Size and space carrying channels to insure that the maximum deflection specified will not be exceeded.
      (2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.
   b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fire proofing is installed. Weld or use steel clips to attach to beam to develop full strength of carrying channel.
   c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.

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) or 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 is accordance with ASTM E580.

2. Connect bracing wires to structure above as specified for anchorage to structure and to

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.

3.5 CLEAN-UP AND COMPLETION

A. Replace damaged, discolored, dirty, cracked and broken acoustical units.

B. Leave finished work free from defects.

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SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the installation of vinyl or rubber base and resilient stair treads with sheet rubber flooring on landings.

1.2 RELATED WORK

A. Color, style and texture: Refer to Construction Documents, finish schedule and materials legend.

B. Sheet flooring: Section 09 65 16, RESILIENT SHEET FLOORING.

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. Base and stair material manufacturer's recommendations for adhesives.
3. Application and installation instructions.

C. Samples:

1. Base: 150 mm (6 inches) long, each type and color.
2. Resilient Stair Treads: 150 mm (6 inches) long.
4. Adhesive: Literature indicating each type.

1.4 DELIVERY

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Materials from containers which have been distorted, damaged or opened prior to installation will be rejected.

1.5 STORAGE

A. Store materials in weather tight and dry storage facility.

B. Protect material from damage by handling and construction operations before, during, and after installation.

1.6 APPLICABLE PUBLICATIONS

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

B. American Society for Testing and Materials (ASTM):
F1861-08.....Resilient Wall Base

C. Federal Specifications (Fed. Spec.):
RR-T-650E.....Treads, Metallic and Non-Metallic, Nonskid

PART 2 - PRODUCTS

2.1 GENERAL

Use only products by the same manufacturer and from the same production run.

2.2 RESILIENT BASE

A. ASTM F1861, 3 mm (1/8 inch) thick, 100 mm (4 1/4 inches) high, Type TP Rubber, Thermoplastics, Group 2-layered with molded top. Style coved at hard surfaces, and straight at carpeted areas.

2.2 RESILIENT TRANSITIONS

A. ASTM E 648 Class I, polyvinyl chloride (PVC)

2.3 RESILIENT TREADS

A. Fed. Spec. RR-T-650, Composition A, Type 2, 5 mm (3/16 inch) thick on wear surface tapering to 3 mm (1/8 inch) thick at riser end.

B. Nosing shape to conform to sub-tread nosing shape.

2.5 PRIMER (FOR CONCRETE FLOORS)

As recommended by the adhesive and tile manufacturer.

2.6 LEVELING COMPOUND (FOR CONCRETE FLOORS)

Provide products with latex or polyvinyl acetate resins in the mix.

2.7 ADHESIVES

A. Use products recommended by the material manufacturer for the conditions of use.

B. Use low-VOC adhesive during installation. Water based adhesive with low VOC is preferred over solvent based adhesive.

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 representative.

B. Submit proposed installation deviation from this specification to the COR indicating the differences in the method of installation.

C. The COR 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, install base over toe space of base of casework and lockers.
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 for Style B-cove:
   1. Score back of outside corner.
   2. Score face of inside corner and notch cove.

D. Form corners and end stops as follows for Style Millwork:
   1. Miter cut for outside corner.
   2. Miter cut for inside corner.

E. Roll base for complete adhesion.

3.5 STAIR TREAD INSTALLATION

A. Prepare surfaces to receive the treads in accordance with applicable portions of paragraph, preparation.

B. Layout of Treads.
   1. No joints will be accepted in treads.,
   2. Set full treads on intermediate and floor landings.

C. Application:
   1. Apply adhesive uniformly with no bare spots.
   2. Roll and pound treads to assure adhesion.

3.7 CLEANING AND PROTECTION

A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.

B. Keep traffic off resilient material for at least 72 hours after installation.

C. Clean and polish materials in the following order:
   1. After two weeks, scrub resilient base, sheet rubber and treads materials with a minimum amount of water and a mild detergent. Leave surfaces clean and free of detergent residue. Polish resilient base to a gloss finish.
   2. Do not polish tread and sheet rubber materials.

D. When construction traffic is anticipated, cover tread materials with reinforced kraft paper and plywood or hardboard properly secured and maintained until removal is directed by the COR.

E. Where protective materials are removed and immediately prior to acceptance, replace damaged materials and re-clean resilient materials. Damaged materials are defined as having cuts, gouges, scrapes or tears and not fully adhered.

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SECTION 09 65 16
RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies the installation of sheet flooring and integral cove base.

B. Grades of resilient sheet vinyl floor covering having vinyl plastic wear layer with backing.

C. Installation of sheet flooring including:

1. Heat welded seams.
2. Integral cove base: Installed at intersection of floor and vertical surfaces.

1.2 RELATED WORK

A. Color, pattern and texture: Refer to construction documents, finish schedule and materials legend

B. Flooring transition conditions: Refer to Typical Flooring Transition Details within Construction Documents

C. Resilient base over base of lockers, equipment and casework: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

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. Heat welded seaming is manufacturers prescribed method of installation.
2. Installer is approved by manufacturer of materials and has technical qualifications, experience, trained personnel, and facilities to install specified items.
3. 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 sheet vinyl floor coverings 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 floor covering manufacturer shall certify that products supplied for installation comply with local regulations controlling use of volatile organic compounds (VOC's).

1.4 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, submit following:

B. Manufacturer's Literature and Data:

1. Description of resilient material and accessories to be provided.
2. Resilient material manufacturer's recommendations for adhesives, weld rods, sealants, and underlayment.
3. Application and installation instructions.

C. Samples:

1. Sheet material, 38 mm by 300 mm (1-1/2 inch by 12 inch), of each color and pattern with a welded seam using proposed welding rod 300 mm (12 inches) square for each type, pattern and color.
2. Cap strip and fillet strip, 300 mm (12 inches) for integral base.
3. Shop Drawings and Certificates: Layout of joints showing patterns where joints are expressed, and type and location of obscure type joints. Indicate orientation of directional patterns.
4. Certificates: Quality Control Certificate Submittals and lists specified in paragraph, QUALIFICATIONS.
5. Edge strips: 150 mm (6 inches) long each type.
6. Adhesive, underlayment and primer: Pint container, each type.

1.5 PROJECT CONDITIONS

A. Maintain temperature of floor materials and room, where work occurs, above 21 ° C (70 °F) and below 29 °C (85 °F) for one week before including week-end hours, during and for 7 days after installation. After above period, room temperature shall not fall below 13 °C (55 °F) or above 29 °C (85 °F).

B. Construction in or near areas to receive flooring work shall be complete, dry and cured. Do not install resilient flooring over slabs until they have been cured and are sufficiently dry to achieve a bond with adhesive. Follow flooring manufacturer's recommendations for bond and moisture testing.

C. Building shall be permanently enclosed. Schedule construction so that floor receives no construction traffic when completed.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in original sealed packages or containers; labeled for identification with manufacturer's name and brand.

B. Deliver sheet flooring full width roll, completely enclosed in factory wrap, clearly marked with the manufacturer's number, type and color, production run number and manufacture date.

C. Store materials in weather tight and dry storage facility. Protect from damage due to handling, weather, and construction operations before, during and after installation. Store sheet flooring on end with ambient temperatures maintained as recommended by manufacturer.

D. Store sheet flooring on end.

E. Move sheet vinyl floor coverings and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

1.7 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 Materials (ASTM):

E648-10.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Energy Source.

E662-12.....Specific Optical Density of Smoke Generated by Solid Materials.

F710-08.....Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

F1303-04(2009).....Sheet Vinyl Floor Covering with Backing.

F1869-10.....Moisture Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride

F1913-04(2010).....Sheet Vinyl Flooring without Backing

F2170-09.....Determining Relative Humidity in Concrete Floor Slabs using In-situ Probes

C. Resilient Floor Covering Institute (RFCI):

Recommended Work Practices for Removal of Resilient Floor Coverings.

1.8 SCHEDULING

Interior finish work such as plastering, drywall finishing, concrete, ceiling work, and painting work shall be complete and dry before installation. Mechanical, electrical, and other work above ceiling line shall be completed. Heating, ventilating, and air conditioning systems shall be installed and operating in order to maintain temperature and humidity requirements.

1.9 WARRANTY:

Submit written warranty, in accordance with FAR clause 52.246-21, Warranty of Construction requirements except that warranty period shall be extended to include two (2) years.

PART 2 - PRODUCTS

2.1 SHEET VINYL FLOOR COVERINGS

A. Sheet Vinyl Floor Coverings: Smooth face, minimum thickness nominal 3.175 mm non-cushioned (0.125 inch). Sheet flooring shall conform to ASTM F1913, backing classification not applicable. Foam backed sheet flooring is not acceptable.

B. Size: Provide maximum size sheet vinyl material produced by manufacturer to provide minimum number of joints. Minimum size width acceptable - 72 inches.

C. Each color and pattern of sheet flooring shall be of same production run.

2.2 WELDING ROD:

Product of floor covering manufacturer in color shall match field color of sheet vinyl covering, unless accented welding rod is called for.

2.3 APPLICATION MATERIALS AND ACCESSORIES

A. Floor and Base Adhesive: Type recommended by sheet flooring material manufacturer for conditions of use.

B. Mastic Underlayment (for concrete floors): Provide products with latex. Condition to be corrected shall determine type of underlayment selected for use.

C. Base Accessories:

1. Fillet Strip: 19 mm (3/4 inch) radius fillet strip compatible with resilient sheet material.
2. Cap Strip: Extruded flanged zero edge vinyl reducer strip approximately 25 mm (one inch) exposed height with 13 mm (1/2 inch) flange.

2.4 SHEET FLOORING

A. Minimum nominal thickness 2.2 mm (0.086 inch); 1800 mm (6 ft) minimum width.

B. Critical Radiant Flux: 0.45 watts per sq.cm or more, class I, per ASTM E648.

C. Smoke density: less than 450 per ASTM E662.

D. Color and pattern of sheet flooring of the same production run.

2.5 ADHESIVES

Water resistant type (two part polyurethane) recommended by the sheet flooring manufacturer for the conditions of use.

2.6 BASE CAP STRIP AND COVE STRIP

A. Extruded vinyl compatible with the sheet flooring.

B. Cap strip "J" shape with feathered edge flange approximately 25 mm (one inch) wide; top designed to receive sheet flooring with 13 mm (1/2 inch) flange lapping top of flooring

C. Cove strip 70 mm (2-3/4 inch) radius.

2.7 LEVELING COMPOUND (FOR CONCRETE FLOORS)

Provide cementitious products with latex or polyvinyl acetate resins in the mix. Minimum of 3500 psi.

2.8 PRIMER (FOR CONCRETE SUBFLOORS)

As recommended by the adhesive or sheet flooring manufacturer.

2.9 EDGE STRIPS

A. Extruded aluminum, mill finish, mechanically cleaned.

B. 28 mm (1-l/8 inch) wide, 6 mm (1/4 inch) thick, bevel one edge to 3 mm (1/8 inch) thick.

C. Drill and counter sink edge strips for flat head screws. Space holes near ends and approximately 225 mm (9 inches) on center in between.

2.10 SEALANT

A. As specified in Section 07 92 00, JOINT SEALANTS.

B. Compatible with sheet flooring.

2.11 WARRANTY

A. Ten (10) year limited warranty commencing on date of substantial completion.

2.12 INSTALLER

A. The installer shall be a certified installer for the specified product(s).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine subfloor surfaces to determine that they are dry, clean, and smooth.

B. Perform bond and moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry as well as to ascertain presence of curing compound. Do not use curing compounds on concrete subfloors.

C. Submit moisture and concrete pH tests to Flooring Distributor before ordering flooring product

D. Perform bond test at the rate of one per 50 square feet.

E. Do not allow resilient sheet flooring work to proceed until subfloor surfaces are satisfactory. **Indicate adverse conditions of any type by letter to Architect and Flooring Distributor.**

3.2 PROJECT CONDITIONS

A. Maintain temperature of sheet flooring above 21 ° C (70 °F), for one week before installation including week-end hours.

B. Maintain temperature of rooms where sheet flooring work occurs above 21 ° C (70 °F), for one week before installation including week-end hours, during and for 7 days after installation.

C. After installation, maintain temperature that shall not fall below 13 °C (55 °F) or above 29 °C (85 °F).

D. Building is permanently enclosed.

E. Wet construction in or near areas to receive sheet flooring is complete, dry and cured.

3.3 SUBFLOOR PREPARATION

A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710.

1. Installer shall examine surfaces on which resilient sheet flooring is to be installed, and shall advise Contractor, in writing, of areas which are unacceptable for installation of flooring material. Installer shall advise Contractor which methods are to be used to correct conditions that will impair proper installation. Installation shall not proceed until unsatisfactory conditions have been corrected.

2. Slab substrates dry, free of curing compounds, sealers, hardeners, and other materials which would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond

and moisture tests recommended by Resilient Floor Covering Institute recommendations in manual RFCI-MRP.

3. Inspect substrate for any contamination, such as oil drippings, cutback adhesives, etc. Encapsulate contamination with an encapsulator before progressing with the installation of the floor covering. The use of solvent-based adhesive removers is NOT recommended. Mapei's Plan/Patch Plus and Ardex 15 are acceptable coverings. Self-leveling underlayments can have very high moisture contents and require longer curing times, some up to 10 days. Check with a moisture meter before starting installation.

B. Broom or vacuum clean substrates to be covered by sheet vinyl floor coverings immediately before installation. Following cleaning, examine substrates to determine if there is visually any evidence of moisture, alkaline salts, carbonation, or dust.

C. Primer: If recommended by flooring manufacturer, prior to application of adhesive, apply concrete slab primer in accordance with manufacturer's directions.

D. Correct conditions which will impair proper installation, including trowel marks, pits, dents, protrusions, cracks or joints.

E. 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.

F. Clean floor of oil, paint, dust and deleterious substances. Leave floor dry and cured free of residue from existing curing or cleaning agents.

G. Concrete Subfloor Testing:

Determine adhesion and dryness of the floor by bond and moisture tests as recommended by RFCI manual MPR.

3.4 INSTALLATION OF FLOORING

A. Install work in strict compliance with manufacturer's instructions and approved layout drawings.

B. Maintain uniformity of sheet vinyl floor covering direction and avoid cross seams, unless noted otherwise.

C. Arrange for a minimum number of seams and place them in inconspicuous and low traffic areas, but in no case less than 150 mm (6 inches) away from parallel joints in flooring substrates.

D. Match edges of resilient floor coverings for color shading and pattern at seams.

E. Where resilient sheet flooring abuts other flooring material floors shall finish level. Provide ramp down from resinous flooring a minimum of 18" – 24" to create a flush transition between the two products.

F. Extend sheet vinyl floor coverings into toe spaces, door reveals, closets, and similar openings.

G. Sheet vinyl to abut tightly to wall surface. Seal joint with waterproof cement or sealant.

H. Inform the COR of conflicts between this section and the manufacturer's instructions or recommendations for auxiliary materials, or installation methods, before proceeding.

I. Install sheet in full coverage adhesives.
   1. Air pockets or loose edges will not be accepted.
   2. Trim sheet materials to touch in the length of intersection at pipes and vertical projections; seal joints at pipe with waterproof cement or sealant.

J. Scribe, cut and fit resilient sheet flooring to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions. Floor shall be tight to door bucks.

K. Keep joints to a minimum; avoid small filler pieces or strips.

L. Follow manufacturer’s recommendations for seams at butt joints. Do not leave any open joints that would be readily visible from a standing position.

M. Follow manufacturer’s recommendations regarding pattern match, if applicable.

N. Installation of Edge Strips:
   1. Locate edge strips under center lines of doors unless otherwise indicated.
   2. Set aluminum strips in adhesive, anchor with lead anchors and stainless steel Phillips screws.

O. Integral Cove Base Installation:
   1. Set preformed fillet strip to receive base.

2. Install the base with adhesive, terminate expose edge with the cap strip.
3. Form internal and external corners to the geometric shape generated by the cove at either straight or radius corners.
4. Solvent weld joints as specified for the flooring. Seal cap strip to wall with an adhesive type sealant.
5. Unless otherwise specified or shown where sheet flooring is scheduled, provide integral base at intersection of floor and vertical surfaces. Provide sheet flooring and base scheduled for room on floors and walls under and behind areas where casework, laboratory and pharmacy furniture and other equipment occurs, except where mounted in wall recesses.

P. Floor covering should not be installed over expansion joints. Expansion joint covers compatible with floor covering should be used.

Q. Roll out resilient sheet flooring material with top surface up. Trim off all damage edges. Allow material to relax for twenty four (24) hours.

3.5 INSTALLATION OF INTEGRAL COVED BASE

A. Set preformed cove to receive base. Install base material with adhesive and terminate exposed edge with cap strip. Integral base shall be 100 mm (4 inches) high.

B. Internal and external corners shall be formed to geometric shape generated by cove at either square or radius corners.

3.6 WELDING

A. Heat weld all joints of flooring and base using equipment and procedures recommended by flooring manufacturer.

B. Welding shall consist of routing joint, inserting a welding rod into routed space, and terminally fusing into a homogeneous joint.

C. Upon completion of welding, surface across joint shall finish flush, free from voids, and recessed or raised areas.

D. Fusion of Material: Joint shall be fused a minimum of 65 percent through thickness of material, and after welding shall meet specified characteristics for flooring.

3.7 CLEANING

A. Clean small adhesive marks during application of sheet flooring and base before adhesive sets, excessive adhesive smearing will not be accepted.

B. Remove visible adhesive and other surface blemishes using methods and cleaner recommended by floor covering manufacturers.

C. Clean materials per flooring manufacturer’s written recommendations.

D. Vacuum floor thoroughly.

E. Do not wash floor until after period recommended by floor covering manufacturer and then prepare in accordance with manufacturer’s recommendations.

F. Upon completion, COR shall inspect floor and base to ascertain that work was done in accordance with manufacturer's printed instructions.

G. Perform initial maintenance according to flooring manufacturer’s written recommendations.

3.8 PROTECTION:

A. Protect installed flooring as recommended by flooring manufacturer against damage from rolling loads, other trades, or placement of fixtures and furnishings.

B. Keep foot traffic off sheet flooring for 24 hours after installation and no heavy fixtures or rolling carts are to be used on the floor for 72 hours.

C. Where construction traffic is anticipated, cover sheet flooring with reinforced kraft paper properly secured and maintained until removal is authorized by the COR.

D. Where protective materials are removed and immediately prior to acceptance, repair any damage, re-clean sheet flooring, lightly re-apply polish and buff floor.

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SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the installation of solid vinyl tile flooring, vinyl composition tile flooring, rubber tile flooring, and accessories.

1.2 RELATED WORK

A. Color and pattern and location in room finish schedule and finish legend

B. Typical Flooring Transition Details in Construction Documents

C. 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.

D. Shop Drawings:

1. Layout of patterns shown on the drawings.

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):

D4078-02 (2008).....Water Emulsion Floor Finish

E648-10.....Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

E662-09.....Specific Optical Density of Smoke Generated by Solid Materials

E1155-96 (R2008).....Determining Floor Flatness and Floor Levelness Numbers

F510-93 (R 2008).....Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method

F710-08.....Preparing Concrete Floors to Receive Resilient Flooring

F1066-04 (R2010).....Vinyl Composition 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 VINYL COMPOSITION TILE

A. ASTM F1066, Class 2 (through pattern), 3 mm (1/8 inch) thick.

B. Color and pattern uniformly distributed throughout thickness.

2.5 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.

2.6 PRIMER (FOR CONCRETE SUBFLOORS)

As recommended by the adhesive and tile manufacturer.

2.7 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.

2.8 POLISH AND CLEANERS

A. Cleaners RFCI CL-1.

B. Polish: ASTM D4078.

2.9 EDGE STRIPS

A. 28 mm (1-1/8 inch) wide unless shown otherwise.

B. Bevel from maximum thickness to minimum thickness for flush joint unless shown otherwise.

C. Extruded aluminum, mill finish, mechanically cleaned:

1. Drill and counter sink edge strip for flat head screws.
2. Space holes near ends and approximately 225 mm (9 inches) on center between.

D. Resilient Edge Strip or Reducer Strip: Fed. Specs. SS-T-312, Solid vinyl.

E. Refer to Typical Flooring Transition Details in Construction Documents

2.10 SCREWS

Stainless steel flat head screw.

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

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 COR 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. Anchor metal edge strips with anchors and screws specified.
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 adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.

B. Keep traffic off resilient material for a minimum 72 hours after installation.

C. Clean and polish 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.
3. Apply polish to the floors in accordance with the polish manufacturer's instructions.

D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by COR. At entrances and where wheeled vehicles or carts are used, cover tile with plywood, hardboard, or particle board over paper, secured and maintained until removal is directed by COR.

E. When protective materials are removed and immediately prior to acceptance, replace any damage tile, re-clean resilient materials, lightly re-apply polish and buff floors.

3.6 LOCATION

A. Unless otherwise specified or shown, install tile flooring, on floor under areas where casework, laboratory and pharmacy furniture and other equipment occurs, except where mounted in wall recesses.

B. Extend tile flooring for room into adjacent closets and alcoves.

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SECTION 09 68 00
CARPETING

PART 1 - GENERAL

1.1 DESCRIPTION

Section specifies carpet, edge strips, adhesives, and other items required for complete installation.

1.2 RELATED WORK

A. Resilient wall base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

B. Wood base: Section 06 20 00, FINISH CARPENTRY AND MILLWORK.

1.3 QUALITY ASSURANCE

1. Carpet installed by mechanics certified by the Floor Covering Installation Board.
2. 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 on finish plan and material legend.
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 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.

F. See Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS for additional submittal requirements.

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

Areas in which carpeting is to be installed shall be maintained at a temperature above 18 degrees C (65 degrees F) to 35 degrees C (95 degrees F) for 24 hours before installation, during installation and after installation. 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

Carpet and installation subject to terms of "Warranty of Construction" article in Bid Solicitation GENERAL CONDITIONS except that warranty period is extended to two years. Carpet to have Lifetime Limited Wear and Backing Warranty.

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 Association of Textile Chemists and Colorists (AATCC):
AATCC 16-98.....Colorfastness to Light
AATCC 129-01.....Colorfastness to Ozone in the Atmosphere under High Humidities
AATCC 134-01.....Electric Static Propensity of Carpets
AATCC 165-99.....Colorfastness to Crocking: Carpets-AATCC Crockmeter Method

C. American Society for Testing and Materials (ASTM):
ASTM D1335-98.....Tuft Bind of Pile Yarn Floor Coverings
ASTM D3278-97.....Flash Point of Liquids by Small Scale Closed-Cup Apparatus

ASTM D5252-98.....Operation of the Hexapod Tumble Drum Tester

ASTM D5417-99.....Operation of the Vettermann Drum Tester

ASTM E648-00.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

D. The Carpet and Rug Institute (CRI):

CRI 104-96.....Installation of Commercial Carpet

PART 2 - PRODUCTS

2.1 CARPET

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: 61 cm (24 inches)square tile.
3. Provide static control to permanently control static build up to less than 3.5 KV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
4. Finished Pile Thickness: 0.150 (3.81 mm)
5. Pile Fiber: 100% nylon, 53% solution dyed, 47% yarn dyed eco solution nylon.
6. Pile Type: multilevel pattern cut/loop.
7. Backing materials: Manufacturer’s Standard synthetic for glue-down installation.
8. Flammability and Critical Radiant Flux Requirements:
   a. Test Carpet in accordance with ASTM E 648.
   b. Class I: Not less than 0.45 watts per square centimeter.
   c. Carpet in corridors, exits and Medical Facilities: Class I.
9. Density: Average Pile Yarn Density (APYD):
   a. Corridors, lobbies, entrances, common areas or multipurpose rooms, open offices, waiting areas and dining areas: Minimum APYD 7680.
   b. Other areas: Minimum APYD 4000.

2.2 ADHESIVE AND CONCRETE PRIMER

A. Full spread adhesives for modular tile carpet in accordance with written instructions by carpet manufacturer. Adhesive to be manufacturer’s recommended adhesive. Install per manufacturer’s installation recommendations.

2.3 SEAMING TAPE

A. Permanently resistant to carpet cleaning solutions, steam, and water.

B. Recommended by carpet manufacturer.

2.4 EDGE STRIPS (MOLDING)

A. Vinyl 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.

2.5 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 INSTALLTION

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 as indicated on finish drawings.
   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 vinyl 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.

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SECTION 09 75 20
QUARTZ SURFACES

PART 1-GENERAL

1.1 DESCRIPTION

This section specifies vertical and trim quartz surface products used as base, countertops and backsplash.

1.2 RELATED WORK

A. Section 06 20 00, FINISH CARPENTRY AND MILLWORK.

1.3 SUBMITTALS

A. Product data:
   1. For each type of product indicated.

B. Shop drawings:
   1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
      a. Show full-size details, edge details, attachments, etc.

C. Samples:
   1. For each type of product indicated:
      a. Submit minimum 6-inch by 6-inch sample in specified color.
      b. Cut sample and seam together for representation of exposed seam.
      c. Indicate full range of color and pattern variation.
   2. Approved samples will be retained as a standard for work.

D. Product data:
   1. Indicate product description, fabrication information and compliance with specified performance requirements.

E. Product certificates:
   1. For each type of product, signed by product manufacturer.

F. Fabricator/installer qualifications:
   1. Provide copy of registration number.

G. Manufacturer certificates:
   1. Signed by manufacturers certifying that they comply with requirements.

H. Maintenance data:
   1. Submit manufacturer’s care and maintenance data.

a. Maintenance kit for finishes shall be submitted.

2. Include in project closeout documents.

E. See Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS for additional submittal requirements.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

B. Fabricator/installer qualifications:

1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

C. Applicable standards:

1. Standards of the following, as referenced herein:

a. American National Standards Institute (ANSI)

b. American Society for Testing and Materials (ASTM)

c. National Electrical Manufacturers Association (NEMA)

2. Fire test response characteristics:

a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E 84) or another testing and inspecting agency acceptable to authorities having jurisdiction:

1) Flame Spread Index: 25 or less.

2) Smoke Developed Index: 450 or less.

D. Coordination drawings:

1. Shall be prepared indicating:

a. Electrical work

b. Miscellaneous steel for the general work.

c. Indicate location of all walls (rated and non-rated), blocking locations and recessed wall items, etc.

2. Content:

a. Project-specific information, based on field verified dimensions; drawn accurately to scale.

b. Do not base coordination drawings on reproductions of the contract documents or standard printed data.

c. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
d. Provide alternate sketches to designer for resolution of such conflicts.
1) Minor dimension changes and difficult installations will not be considered changes to the contract.

3. Drawings shall:
a. Be produced in 1/2-inch scale for all fabricated items.

4. Drawings must be complete and submitted to the architect within 60 days after award of contract for record only.
a. No review or approval will be forthcoming.
b. Coordination drawings are required for the benefit of contractor's fabricators/installers as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.

E. Pre-installation conference:
1. Conduct conference at project site to comply with requirements in Division 1.

F. Field verification:
1. Contractor to field verify all dimensions in field prior to ordering material.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver no components to project site until areas are ready for installation.

B. Store components indoors prior to installation.

C. Handle materials to prevent damage to finished surfaces.
1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.6 WARRANTY

A. Provide manufacturer's 10-year warranty against defects in materials.
1. Warranty shall provide material to repair or replace defective materials.
2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

1.7 MAINTENANCE

A. Provide maintenance requirements as specified by the manufacturer.

PART 2 — PRODUCTS

2.1 MATERIALS

A. Material:

1. Homogeneous quartz surfaces material.
2. Material shall have minimum physical and performance properties specified.

B. Thickness:

1. 2 cm (3/4") for wall base and backsplash.
2. 3 cm (1 1/8") for countertops.

C. Edge treatment:

1. As indicated.

D. Seam width:

1. 1/8" unless otherwise specified.

E. Performance characteristics: physical properties data sheet:

Property	**Typical Result**	**Test Procedure**
Flexural Strength	>5,300 psi	ASTM D 790
Flexural Modulus	5.3-5.7E^{6} psi	ASTM D 790
Flexural Elongation	>0.1%	ASTM D 790
Compression Strength (Dry)	~27,000 psi	ASTM C 170
Compression Strength (Wet)	~24,000 psi	ASTM C 170
Hardness	7	Mohs' Hardness Scale
Thermal Expansion	1.45 x 10^{-5} in./in./°C	ASTM D 696
Gloss (60° Gardner)	45-50	ANSI Z 124
Colorfastness	Passes	ANSI Z 124.6.5.1
Wear and Cleanability	Passes	ANSI Z 124.6.5.3
Stain Resistance	Passes	ANSI Z 124.6 (stain 5.2, chemical 5.5, cigarette 5.4 resistances)
Fungal and Bacterial Resistance	No growth	ASTM G 21 & G 22
High Temperature Resistance (356°F)	None to slight effect	NEMA LD 3.3.6*
Boiling Water Resistance	None to slight effect	NEMA LD 3.3.5*
Freeze-Thaw Cycling	Unaffected	ASTM C 1026
Point Impact	Passes	ANSI Z 124.6.4.2
Ball Impact	164 inches	NEMA LD 3.3.8*
Slip Resistance	Above 0.80 for textured models	ASTM C 1028

Static Coefficient of Friction (as received)	0.89/0.61 (wet/dry)	ASTM C 1028
Static Coefficient of Friction (with renovator)	0.87/0.65 (wet/dry)	ASTM C 1028
Abrasion Resistance	139	ASTM C 501
Specific Gravity	2.44	ASTM D 792
Density	~2400 kg/m3	
Water Absorption	0.12%	ASTM C 373
Long- and Short-Term	<0.04%	ASTM D 570
Moisture Expansion	<0.01% on average	ASTM C 370
Toxicity	Passes, LC50=68-128	Pittsburgh Protocol
Flammability	For all colors tested (Class I and Class A)	ASTM E 84, UL 723 and NFPA 255
Flame Spread Index	FSI <10 for 3 cm and <15 for 2 cm	
Smoke Developed Index	SDI <50 for 3 cm and <100 for 2 cm	
Nominal Thickness	2 cm and 3 cm	
Nominal Weight	10 lb./ft.2 (2 cm) 15 lb./ft.2 (3 cm)	

* NEMA results based on the NEMA LD 3-2000

2.3 ACCESSORIES

A. Joint adhesive:

1. Manufacturer’s approved adhesive to create color-matched seam.

2.4 FACTORY FABRICATION

A. Shop assembly:

1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer’s printed instructions and technical bulletins.
2. Form joints, if required, between components using manufacturer’s standard joint adhesives.
3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
4. Rout and finish component edges with clean, sharp returns.
   a. Rout cutouts, radii and contours to template.
   b. Smooth edges.

PART 3 — EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances, and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

1. Provide product in the largest pieces available.
2. Form field joints using manufacturer’s recommended adhesive, with joints inconspicuous in finished work.
   a. Exposed joints/seams shall not be allowed.
3. Reinforce field joints as required using manufacturer’s written instructions.
4. Cut and finish component edges with clean, sharp returns.
5. Route radii and contours to template.
6. Carefully dress joints smooth, remove surface scratches and clean entire surface.

3.3 REPAIR

A. Repair or replace damaged work that cannot be repaired to architect’s satisfaction.

3.4 CLEANING AND PROTECTION

A. Keep components clean during installation.

B. Remove adhesives, sealants and other stains.

- - - 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 shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.

D. Section includes identification for Smoke and Fire Barriers and Partitions in accordance with the Life Safety Plan.

1.2 RELATED WORK

A. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 – DOORS AND WINDOWS, Division 10 - SPECIALTIES, Division 21 – FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 – HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 – ELECTRONIC SAFETY AND SECURITY sections.

B. Contractor option: Prefinished flush doors with transparent finishes: Section 08 14 00, INTERIOR WOOD DOORS.

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 code number specified on Finish Plan and Material Legend.
   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.

F. Submit Ohio VOC EPA compliant products only.

G. See Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS for additional submittal requirements.

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.
   6. VOC content

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 MOCK-UP PANEL

A. Before starting application of water paint mixtures, apply paint as specified to an area, not to exceed 9 m^2 (100 ft^2), selected by COR.

B. Finish and texture approved by COR will be used as a standard of quality for remainder of work.

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 basic designation only.

B. American Conference of Governmental Industrial Hygienists (ACGIH):
ACGIH TLV-BKLT-1992.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
ACGIH TLV-DOC.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Sixth Edition)

C. American National Standards Institute (ANSI):
A13.1-96.....Scheme for the Identification of Piping Systems

D. American Society for Testing and Materials (ASTM):
D260-86.....Boiled Linseed Oil

E. Commercial Item Description (CID):
A-A-1555.....Water Paint, Powder (Cementitious, White and Colors) (WPC) (cancelled)
A-A-3120.....Paint, For Swimming Pools (RF) (cancelled)

F. Federal Specifications (Fed Spec):
TT-P-1411A.....Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)

G. Steel Structures Painting Council (SSPC):
SSPC SP 1-00.....Solvent Cleaning
SSPC SP 2-00.....Hand Tool Cleaning
SSPC SP 3-00.....Power Tool Cleaning

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood Sealer: MPI 128 (satin) or MPI 130 (gloss)

C. Identity markers options:
1. Pressure sensitive vinyl markers.
2. Snap-on coil plastic markers.

D. Interior Primer Sealer: MPI 45.

E. Interior Enamel Undercoat: MPI 107.

F. Interior Latex Primer Sealer: MPI 50.

G. Interior Latex, MPI Gloss Level Eg-Shell: MPI 144.

H. Interior Latex, Flat, MPI Gloss Level 1: MPI 143.

I. Interior Latex, Flat, MPI Gloss Level 3: MPI 147.

J. Interior Wood Stain, Semi-Transparent (WS): MPI 90.

K. Wood Filler Paste: MPI 91.

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

A. Paint materials shall conform to the restrictions of the local Environmental and Toxic Control jurisdiction.

1. Volatile Organic Compounds (VOC): Use MPI GPS-2-08 compliant products only.
2. Lead-Base Paint:
   a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
3. Asbestos: Materials shall not contain asbestos.
4. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
5. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
6. 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.
6. Varnishing:
   a. Apply in clean areas and in still air.
   b. Before varnishing vacuum and dust area.
   c. Immediately before varnishing wipe down surfaces with a tack rag.

3.2 SURFACE PREPARATION

A. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays.

B. General:
1. Remove prefinished items not to be painted such as lighting fixtures, escutcheon plates, hardware, trim, and similar items for reinstallation after paint is dried.
2. Remove items for reinstallation and complete painting of such items and adjacent areas when item or adjacent surface is not accessible or finish is different.
3. See other sections of specifications for specified surface conditions and prime coat.
4. Clean surfaces for painting with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry.

C. Wood:
1. Sand to a smooth even surface and then dust off.
2. Sand surfaces showing raised grain smooth between each coat.
3. Wipe surface with a tack rag prior to applying finish.

4. Surface painted with an opaque finish:
   a. Coat knots, sap and pitch streaks with MPI 36, E Range of E3 (Knot Sealer) before applying paint.
   b. Apply two coats of MPI 36, E Range of E3 (Knot Sealer) over large knots.
5. After application of prime or first coat of stain, fill cracks, nail and screw holes, depressions and similar defects with wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
7. Fill open grained wood such as oak, walnut, ash and mahogany with 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. Gypsum Plaster and Gypsum Board:
1. Remove efflorescence, loose and chalking plaster or finishing materials.
2. Remove dust, dirt, and other deterrents to paint adhesion.
3. Fill holes, cracks, and other depressions with CID-A-A-1272A [Plaster, Gypsum (Spackling Compound) finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

3.3 PAINT PREPARATION

A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.
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 COR.
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 COR, except in spaces sealed from existing occupied spaces.

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. Wood and Wood Particleboard:

1. Use same kind of primer specified for exposed face surface.
   a. Interior wood except for transparent finish: MPI 45 (Interior Primer Sealer), thinned if recommended by manufacturer.
   b. Transparent finishes as specified under Transparent Finishes on Wood except Floors and Finish for Wood Floors.
2. Apply MPI 67 (Interior Latex Fire Retardant, Top-Coat (ULC Approved) (FR) to wood for fire retardant finish.

F. Gypsum Board and Hardboard:

1. Surfaces scheduled to have MPI 143 (Interior Latex, Flat), MPI Gloss Level 1 LE) MPI 144 (Interior Latex, MPI Gloss Level Eg-Shell (LE)MPI 147(Interior Latex, Semi-Gloss
2. Primer: MPI 50(Interior Latex Primer Sealer) except use MPI 45 (Interior Primer Sealer) in shower and bathrooms.
3. Surfaces scheduled to receive vinyl coated fabric wallcovering: Use MPI 45 (Interior Primer Sealer).

G. Gypsum Plaster and Veneer Plaster:

1. Surfaces scheduled to receive vinyl coated fabric wallcovering: Use MPI 45 (Interior Primer Sealer).
2. Use MPI 50 (Interior Latex Primer Sealer).

3.6 INTERIOR FINISHES

A. Apply following finish coats over prime coats in spaces or on surfaces.

B. Metal Work:

1. Apply to exposed surfaces.
2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
3. Ferrous Metal, Galvanized Metal, and Other Metals Scheduled:

a. One coat of MPI 107 (Interior Enamel Undercoat) plus one coat of MPI 151; also acceptable Sherwin Williams Pro Industrial Pre-Catalyzed Epoxy

C. Gypsum Board:

1. One coat of MPI 50(Interior Primer Sealer) MPI 143 (Interior Latex, Flat), MPI Gloss Level 1 LE) MPI 144 (Interior Latex, MPI Gloss Level Eg-Shell (LE) MPI 147(Interior Latex, Semi-Gloss).

3.7 REFINISHING EXISTING PAINTED SURFACES

A. Clean, patch and repair existing surfaces as specified under surface preparation.

B. Remove and reinstall items as specified under surface preparation.

C. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.

D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.

E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.

F. In existing rooms and areas where alterations occur, clean existing stained and natural finished wood retouch abraded surfaces and then give entire surface one coat of MPI 128 (Satin) MPI 130 (Gloss).

G. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.

H. Coat knots and pitch streaks showing through old finish with MPI 36 (Knot Sealer) before refinishing.

I. Sand or dull glossy surfaces prior to painting.

J. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.8 PAINT COLOR

A. Color and gloss of finish coats as specified on finish drawings and materials legend.

B. For additional requirements regarding color see Articles, REFINISHING EXISTING PAINTED SURFACE and MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE.

C. Coat Colors:

1. Color of priming coat: Lighter than body coat.
2. Color of body coat: Lighter than finish coat.
3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.

D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:

1. Paint to match color of casework where casework has a paint finish.
2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.9 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. In spaces not scheduled to be finish painted on finish plan paint as specified under paragraph H, colors.

C. 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.

D. Paint after tests have been completed.

E. Omit prime coat from factory prime-coated items.

F. Finish painting of mechanical and electrical equipment is not required when located in interstitial spaces, 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.

G. Omit field painting of items specified in paragraph, Building and Structural WORK NOT PAINTED.

H. Color:

1. Paint items having no color specified on finish plan to match surrounding surfaces.
2. Paint colors as specified on finish plan 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.

I. Apply paint systems on properly prepared and primed surface as follows:
1. Interior Locations:
a. Apply one coat of MPI 107 (Interior, Enamel Undercoat) plus one coat of MPI 151; also acceptable Sherwin Williams Pro Industrial Pre-Catalyzed Epoxy 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.
2. Other exposed locations:
a. Metal surfaces, except aluminum, of cooling towers exposed to view, including connected pipes, rails, and ladders: Two coats of MPI 1 (Aluminum Paint (AP).
b. Cloth jackets of insulation of ducts and pipes in connection with plumbing, air conditioning, ventilating refrigeration and heating systems: One coat of MPI 50 (Interior Latex Primer Sealer) and one coat of MPI 10 (Exterior Latex, Flat (AE) MPI 11 (Exterior Latex Semi-Gloss (AE) MPI 119 (Exterior Latex, High Gloss (acrylic)(AE)

3.10 BUILDING AND STRUCTURAL WORK FIELD PAINTING

A. Painting and finishing of interior and exterior work except as specified under paragraph 3.11 B.
1. Painting and finishing of new and existing work including colors and gloss of finish selected is specified on finish plan.
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. Painting of wood with fire retardant paint exposed in attics, when used as mechanical equipment space except shingles.
5. 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 dumbwaiter, elevator and duct shafts, interstitial spaces, 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. Gas Storage Racks.
   c. Except where specifically specified to be painted.
7. Metal safety treads and nosings.
8. Gaskets.
9. Structural steel encased in concrete, masonry, or other enclosure.
10. Structural steel to receive sprayed-on fire proofing.
11. Ceilings, walls, columns in interstitial spaces.
12. Ceilings, walls, and columns in pipe basements.

3.11 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
Blow-off		Yellow	Black	Blow-off
Boiler Feedwater		Yellow	Black	Blr Feed
A/C Condenser Water Supply		Green	White	A/C Cond Wtr Sup
A/C Condenser Water Return		Green	White	A/C Cond Wtr Ret
Chilled Water Supply		Green	White	Ch. Wtr Sup
Chilled Water Return		Green	White	Ch. Wtr Ret
Shop Compressed Air		Yellow	Black	Shop Air
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
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 _____*
High Temperature Water Supply		Yellow	Black	H. Temp Wtr Sup
High Temperature Water Return		Yellow	Black	H. Temp Wtr Ret
Hot Water Heating Supply		Yellow	Black	H. W. Htg Sup
Hot Water Heating Return		Yellow	Black	H. W. Htg Ret
Gravity Condensate Return		Yellow	Black	Gravity Cond Ret
Pumped Condensate Return		Yellow	Black	Pumped Cond Ret
Vacuum Condensate Return		Yellow	Black	Vac Cond Ret
Fuel Oil - Grade		Green	White	Fuel Oil-Grade __*
Boiler Water Sampling		Yellow	Black	Sample
Chemical Feed		Yellow	Black	Chem Feed
Continuous Blow-Down		Yellow	Black	Cont. B D
Pumped Condensate		Black		Pump Cond
Pump Recirculating		Yellow	Black	Pump-Recirc.
Vent Line		Yellow	Black	Vent
Alkali		Yellow	Black	Alk
Bleach		Yellow	Black	Bleach
Detergent		Yellow	Black	Det
Liquid Supply		Yellow	Black	Liq Sup
Reuse Water		Yellow	Black	Reuse Wtr
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
Tempered Water	White	Yellow	Black	Temp. Wtr
Ice Water				
Supply	White	Green	White	Ice Wtr
Return	White	Green	White	Ice Wtr Ret
Reagent Grade Water		Green	White	RG
Reverse Osmosis		Green	White	RO
Sanitary Waste		Green	White	San Waste
Sanitary Vent		Green	White	San Vent
Storm Drainage		Green	White	St Drain
Pump Drainage		Green	White	Pump Disch
Chemical Resistant Pipe				

Waste	Yellow	Black	Acid Waste
Vent	Yellow	Black	Acid Vent
Atmospheric Vent	Green	White	ATV
Silver Recovery	Green	White	Silver Rec
Oral Evacuation	Green	White	Oral Evac
Fuel Gas	Yellow	Black	Gas
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 25000.
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.

B. Life Safety Partition Identification:
1. Identify partitions above ceilings on both sides of partitions, except within shafts, as indicated by this section.
   a. Locate no more than 6” above finished ceilings.
   b. If no finished ceilings exist, locate in permanently visible location between 7’-6” and 8’-0” above the finished floor.
   c. Stenciled message shall occur not more than 10 feet on center, and no less than once per wall.
2. Stenciled message shall read as follows
   a. "0 HR SMOKE PARTITION"
   b. "1 HR SMOKE BARRIER"
   c. "1 HR FIRE BARREIER"
   d. "2 HR FIRE BARRIER"
   e. Other designations identified in the Life Safety Drawings.
3. Stenciling shall occur in accordance with the Life Safety Plan.
   a. Partitions with more than one rating shall be clearly delineated as to the extent of each rating.
   b. Stencil letter height shall be no less than 2-1/2 inches.

c. Utilize semi-gloss paint of a color which contrasts with color of substrate.

C. Identify columns in pipe basements and interstitial space:

1. Apply stenciled number and letters to correspond with grid numbering and lettering shown.
2. Paint numbers and letters 100 mm (4 inches) high, locate 450 mm (18 inches) below overhead structural slab.
3. Apply on four sides of interior columns and on inside face only of exterior wall columns.
4. Color:
   a. Use black on concrete columns.
   b. Use white or contrasting color on steel columns.

3.12 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 tackboards (bulletin boards) and glass door bulletin boards and related items.

B. Boards may be either factory or field assembled.

C. Where shown, assemble both chalkboards and tackboards into a single unit.

1.3 QUALITY ASSURANCE

Boards shall be the products of one manufacturer.

1.4 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. Bulletin board.
2. Glass door bulletin board.

D. Samples:

1. Tackboard, 300 by 300 mm (six by six inches), each color, mounted on backing.
2. Integrally colored anodized aluminum, 300 mm (six inch) length.
3. Cork filled map rail, 300 mm (six inch) length.
4. Each accessory (after approval, may be used in the work).

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. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual
AMP 501.....Finishes for Aluminum

C. American National Standards Institute(ANSI):

Z97.1-09.....Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

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

B221/B221M-08.....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(R2009).....Nonmetallic Gasket Materials

E. Composite Panel Association (CPA):

A208.1-09.....Particleboard

A135.4-04.....Basic Hardboard

PART 2 - PRODUCTS

2.1 BULLETIN BOARD

Bulletin board shall consist of a tackboard, snap on aluminum frame, grounds and other items specified and shown.

2.2 GLASS DOOR BULLETIN BOARD

Glass door bulletin board shall consist of a tackboard, aluminum tubular frame, sliding aluminum framed glazed doors and other items specified and shown.

2.3 FABRICATION

A. Materials:

1. Aluminum, extruded: ASTM B221.
2. Cork: ASTM F104, Type II, mildew resistant, Class 2.
3. Backing: Hardboard, AHBA A135.4 or particleboard, CPA A208.1.

B. Components:

1. Tackboard: Cork face, 6 mm (1/4-inch) thick factory laminated to a hardboard or particleboard backing
2. Frames (Trim): Extruded aluminum, 1.5 mm (0.060-inch) thick, snap-on type, approximate face width 44 mm (1-3/4 inch), depth and configuration as required to return to wall and engage clips.
3. Display Rail: Snap-on type, same materials as frames, approximate face width one inch with 6 mm (1/4-inch) thick cork insert.
4. Mullions: Snap-on type, same material and face width as frames, designed to finish flush with frame.
5. Grounds: Continuous zinc-coated (galvanized) steel or extruded aluminum members designed to support the tackboard and clips for snap-on frames, and map rail
6. Clips: Manufacturer's standard as required to support frame, mullions, and display rail,
7. Tubular Frame (For glass door bulletin board): Extruded aluminum, 2.34 mm (0.092 inches) thick; tubular or open back in section, with

flanges for concealed attachment, designed to support door hardware and tackboard.

C. Bulletin boards 3660 mm (12 feet) or less in length shall be in one piece.

D. 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).
2. AA 45 chemically etched medium matte, with integrally colored anodic coating, Class II Architectural, 0.4 mils thick (AA-M12C22A32, of color to match approved sample).

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 BULLETIN BOARD:

A. (Except glass door bulletin boards):

1. Mount bulletin boards with adhesive and blocking pads spaced 16 inches on center each way.
2. 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.
3. Miter trim at corners, conceal fasteners. Modify trim as required to conform to surrounding construction details.

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SECTION 10 21 23
CUBICLE CURTAIN TRACKS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies cubicle curtain track (C.C.T.) and intravenous support assembly (I.V).

1.2 RELATED WORK

Steel shapes for suspending track assembly: Section 05 50 00, METAL FABRICATIONS and Section 09 51 00, ACOUSTICAL CEILINGS.

1.3 SUBMITTALS

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

B. Samples:
One 300 mm (12 inch) long piece of cubicle curtain track with carrier access and end stop.
One clip anchor for fastening track to grid system of acoustical ceilings. One curtain carrier.
One intravenous support assembly consisting 300 mm (12 inch) long pieces of track, carrier assembly, and bottle pendant.

C. Shop Drawings: Showing layout of tracks and method of anchorage.

D. Manufacturer's Literature and Data:
Cubicle curtain track.
Intravenous support assembly.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver material in original package marked to identify the contents, brand name, and the name of the manufacturer or supplier.

B. Store in dry and protected location. Store so as to not bend or warp the tracks.

C. Do not open packages until contents are needed for installation, unless verification inspection is required.

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 for Testing and Materials (ASTM):
B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
B456-03(R2009).....Electrodeposited Coatings for Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

C. The National Association of Architectural Metal Manufacturers (NAAMM): AMP 500 Series.....Metal Finishes Manual

PART 2 - PRODUCTS

2.1 CUBICLE CURTAIN TRACKS

A. Surface mounted:
   1. Channel Tracks (Surface Mounted Type): Extruded aluminum, ASTM B221, alloy 6063, temper T5 or T6, channel shaped, with smooth inside raceway for curtain carriers.
   2. Tubular Track (Suspended Type): Seamless drawn aluminum tubing, ASTM B221, alloy 6061 temper T6, 25 mm (one inch) outside diameter, not less than 1.5 mm (0.060 inch) wall thickness, slotted for interior carriers.

B. Curtain Carriers: Nylon or delrin carriers, with either nylon or delrin wheels on metal, delrin, or nylon axles. Equip each carrier with either stainless steel, chromium plated brass or steel hooks with swivel, or nickel chromium plated brass or stainless steel bead chain and hook assembly, or delrin carriers may have moulded on delrin hooks. Hook for bead chain may be the same material and finish as the bead chain or may be chromium plated steel. Provide 2.2 carriers for every 300 mm (onefoot) of each section of each track length, plus one additional carrier.

C. End Stop Connectors, Ceiling Flanges and Other Accessories: Fabricate from the same material with the same finish as the tracks or from nylon.

D. Hangers and Fittings: Fabricate from the same material with the same finish as the tracks. Hangers may be round or square for channel tracks and round for tubular tracks. Design fittings to be compatible with design of tracks and to safely transmit the track load to the hangers.

E. At end of each section of track, make provision for insertion and removal of carriers. Design to prevent accidental removal of carrier. Any operating mechanism shall be removable with common tools.

2.2 INTRAVENOUS SUPPORT ASSEMBLY

A. Assembly includes track, carrier assembly, bottle holding pendant, curved track sections and curved connectors, and all components and accessories required for a working installation.

B. Track: Surface mounted channel or "I" beam shaped, extruded aluminum. Equip track with removable section at splicing clamp for carrier removal. Overall size of track shall be as shown on drawings .

C. Carrier Assembly: Assembly shall include a body made of either stainless steel or aluminum, and be equipped with four ball bearing nylon wheels

and lockstop to insure insulation of carrier from track. Equip carrier with a positive locking device to hold carrier stationary when in use. Provide with either a stainless steel, or chromium plated brass hook for support of bottle holding pendent.

D. Bottle Holding Pendent: Equip with a minimum of three, stainless steel, chromium plated steel, or chromium plated brass arms connected to adjustable shaft of same material. Adjustable shaft shall permit bottle holding hub to adjust from full height to approximately 1800 mm (six feet), 75 mm (three inches) above finished floor. Provide shaft with a built-in locking device for vertical height adjustments. Locking device shall be activated by push button or similar easily operated one hand control.

2.3 FASTENERS

A. Exposed Fasteners, Screws and Bolts: Stainless steel or chromium/nickel plated brass.

B. Concealed Fasteners, Screws and Bolts: Hot-dip galvanized (except in high moisture areas use stainless steel).

C. Metal Clips: Anchor curtain tracks to exposed grid of lay-in acoustical tile ceilings, with concealed metal (butterfly) type or two piece snap locking type ceiling clip of high strength spring steel. When it is not possible to install the metal ceiling clip, the cubicle curtain track may be screwed to the ceiling grid.

2.4 FINISHES

A. Aluminum: Finish numbers for aluminum specified are in accordance with The Aluminum Association's Designation System. AA-C22A31 finish

B. Chrome/Nickel Plating: Satin or polished finish as specified, ASTM B546, minimum thickness of chromium plate as follows:

1. 0.2 mil on copper alloys.
2. 0.4 mil on steel.

C. Stainless Steel: No. 4 in accordance with NAAMM Metal Finishes Manual.

2.5 FABRICATION

A. Weld and grind smooth joints of fabricated components.

B. Form tracks and bends of lengths that will produce the minimum number of joints. Make track sections up to 4800 mm (16 feet) without joints. Form corner bend on a 300 mm (12 inch) radius.

C. Provide steel anchor plates, supports, and anchors for securing components to building construction.

D. Form flat surface without distortion.

E. Shop assemble components and package complete with anchors and fittings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install tracks after finish painting and ceiling finishing operations are complete.

B. Install track level and hangers plumb and securely anchor to the ceiling form a rigid installation.

C. Anchor surface mounted curtain tracks directly to exposed grid of lay-in acoustical tile ceilings with suitable fasteners, spaced approximately 600 mm (24 inches) on center.

D. Anchor surface mounted curtain tracks to concrete, plaster and gypsum board ceilings with a minimum of 3 mm (1/8-inch) diameter fastenings or concealed clips spaced not more than 900 mm (three feet) on center.

E. Install suspended track seven feet, three inches above the finished floor, with hangers spaced no more than four feet on center. At ceiling line, provide flange fittings secured to hangers with set screws. Secure track to walls with flanged fittings and to hangers with special fittings.

F. Securely fasten end stop caps to prevent their being forced out by the striking weight of carriers.

H. Remove damaged or defective components and replace with new components or repair to the original condition.

3.2 ACCEPTANCE

A. Track shall be installed neat, rigid, plumb, level and true, and securely anchored to the overhead construction.

B. Carrier units shall operate smoothly and easily over the full range of travel.

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SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies wall guards in the form of crash rails, handrails, corner guards and high impact wall covering.

1.2 RELATED WORK

A. Wood and plastics not specified in this section: Section 06 20 00, FINISH CARPENTRY AND MILLWORK.

B. Gypsum Wallboard not specified in this section: Section 09 29 00, GYPSUM BOARD.

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. Corner Guards.
2. High Impact Wallcovering

D. Test Report: Showing that resilient material complies with specified fire and safety code requirements.

E. See Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS for additional submittal requirements.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

B. Fabricator/installer qualifications:

1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

C. Applicable standards:

1. Standards of the following, as referenced herein:
   a. American National Standards Institute (ANSI)
   b. American Society for Testing and Materials (ASTM)
   c. National Electrical Manufacturers Association (NEMA)

D. Pre-installation meeting

1. Prior to the beginning of work, conduct a pre-job conference at the

job site; to comply with requirements in Division 1.

1.5 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. Follow manufacturer's storing recommendations.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

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

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

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. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual

D. National Fire Protection Association (NFPA):

80-10.....Standard for Fire Doors and Windows

E. Society of American Automotive Engineers (SAE):

J 1545-05.....Instrumental Color Difference Measurement for Exterior Finishes.

F. Underwriters Laboratories Inc. (UL):

Annual Issue.....Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A167, Type 302B.

B. 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 CORNER GUARDS

A. Resilient, Shock-Absorbing Corner Guards:

1. Surface Mounted type (CG.01), 2" leg with 30 mm (1/4 inch radius)

B. Stainless Steel Corner Guards : Fabricate of 1.6 mm (0.0625-inch) thick stainless steel. Form guards of dimensions and to contour shown.

2.3 HIGH IMPACT WALL COVERING

A. Fabricate from vinyl acrylic or polyvinyl chloride resilient material minimum 6mm (0.06 inch) thick designed especially for interior use.

B. Provide adhesive as recommended by the wall covering manufacturer.

2.4 FASTENERS AND ANCHORS

A. Provide fasteners and anchors as required for each specific type of installation.

B. Where type, size, spacing or method of fastening is not shown or specified, submit shop drawings showing proposed installation details.

2.5 FINISH

A. In accordance with NAAMM AMP 500 series.

B. Stainless Steel: NAAMM finish Number 4.

C. Aluminum

1. Exposed aluminum: AAC22A31 chemically etched medium matte, with clear anodic coating, Class II Architectural, 0.4 mil thick. AA-C22A32 chemically etched medium matte with integrally colored anodic coating, Class II Architectural 0.4 mil thick.
2. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.

D. Resilient Material: Embossed texture and color in accordance with SAE J 1545. Refer to construction documents, material legend for finishes.

2.6 FABRICATION

A. Comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thicknesses of components.

B. Shop-assemble components to the greatest extent possible. Disassemble only as necessary for shipping and handling.

C. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of evidence of wrinkling, chipping, uneven coloration, dents, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

D. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors for interconnection of members to other construction.

PART 3 - INSTALLATION

3.1 EXAMINATION

A. Examine areas and conditions in which wall surface protection components and wall protection systems will be installed.

B. Complete finishing operations, including painting, before beginning installation of wall surface protection system materials.

C. Wall surfaces to receive impact-resistant wall covering materials shall be dry and free from dirt, grease, loose paint, and scale.

D. Do not proceed with installations until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Properly prepare substrate and clean to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Mount guards on external corners of interior walls, partitions and columns as shown.

B. Where corner guards are installed on gypsum board, clean surface and anchor guards with a neoprene solvent-type contact adhesive specifically manufactured for use on gypsum board construction. Provide continuous 16 gauge perforated, galvanized Z-shape steel anchors welded to back edges of corner guards and wired to metal stud expansion bolted to concrete or masonry with four 9.5 mm (3/8-inch) diameter bolts, spaced 400 mm (16 inches) on centers. Remove excess adhesive from around edge of guard and allow to cure undisturbed for 24 hours.

C. Install wall surface protection units plumb, level, and true to line without distortions.

D. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished work.

E. Install aluminum retainers, mounting brackets, and other accessories in strict accordance with the manufacturer’s instructions.

F. Where splices occur in horizontal runs of over 20 feet (6 m), splice aluminum retainer and stainless steel cover at same locations along the run.

3.4 HIGH IMPACT WALL COVERING

A. Surfaces to receive protection shall be clean, smooth and free of obstructions.

B. Apply with adhesive in controlled environment according to manufacturer’s recommendations.

3.5 STAINLESS STEEL CORNER GUARDS

A. Mount guards on external corners of interior walls, partitions and columns as shown.

1. GYPSUM BOARD:

a. Surface must be clean and properly sealed.

b. Anchor guards with a neoprene solvent-type contact adhesive specifically manufactured for use on gypsum board construction.

b. Remove excess adhesive from around edges of guard and allow to cure undisturbed for 24 hours.

c. Remove the protective plastic covering from the exposed surface of the corner guard.

3.6 CLEANING

A. Clean plastic covers and accessories using a standard non-ammonia based household cleaning agent.

B. Clean metal components in accordance with the manufacturer's recommendations. Do not use acid solution, steel wool, or other harsh abrasives.

C. Remove excess adhesive in manner recommended by manufacturer.

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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, toilets, baths, and at sinks in related spaces.

B. Items Specified:

1. Paper Towel Dispenser (PTD-1)
2. Combination paper towel dispenser and disposal unit. (CTW-1)
3. Toilet tissue dispenser. (TTD-1, TTD-2)
4. Grab Bars. (GB-18, GB-36, GB-36V, GB-42, GB-60)
5. Shower curtain rod. (SCR-1)
6. Clothes hooks, robe or coat. (RH-1)
7. Towel bars.
8. Metal framed mirror. (FM-1)
9. Soap dispenser. (SD-1)
10. Soap dishes. (SDH-1)
11. Mop racks. (MR-1)
12. Stainless steel shelves, Type 45. (SH-1)
13. Stainless steel shelves at wheelchair lavatory (SH-1)
14. High speed hand dryer. (HHD-1)
15. Sanitary napkin disposal. (SND-1)
16. Toilet seat cover dispenser. (TSC-1)

1.2 RELATED WORK

A. Blocking for Toilet Accessories: Section 06 10 00, ROUGH CARPENTRY or Section 09 22 16, Non-Structural Metal Framing.

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. 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.

1.4 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.

1.5 PACKAGING AND DELIVERY

A. Pack accessories individually to protect finish.

B. Deliver accessories to the project only when installation work in rooms is ready to receive them.

C. Deliver inserts and rough-in frames to site at appropriate time for building-in.

D. Deliver products to site in sealed packages of containers; labeled for identification with manufacturer's name, brand, and contents.

1.6 STORAGE

A. Store products in weathertight and dry storage facility.

B. Protect from damage from handling, weather and construction operations before, during and after installation in accordance with manufacturer's instructions.

1.7 APPLICABLE PUBLICATIONS

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

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

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

A176-99(R2009).....Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip

A269-10.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A312/A312M-09.....Seamless and Welded Austenitic Stainless Steel Pipes

A653/A653M-10.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B456-03(R2009).....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

D635-10.....Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position

F446-85(R2009).....Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.

D3453-07.....Flexible Cellular Materials - Urethane for Furniture and Automotive Cushioning, Bedding, and Similar Applications

D3690-02(R2009).....Vinyl-Coated and Urethane-Coated Upholstery Fabrics

C. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: ASTM B221, alloy 6063-T5 and alloy 6463-T5.

B. 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.

C. Stainless Steel Tubing: ASTM A269, Grade 304 or 304L, seamless or welded.

D. Stainless Steel Pipe: ASTM A312; Grade TP 304 or TP 304L.

E. Steel Sheet: ASTM A653, zinc-coated (galvanized) coating designation G90.

F. Glass:

1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors, and for mirror doors in medicine cabinets.
2. ASTM C1036, Type 1 Class 1 Quality q3, for shelves in medicine cabinets.

G. Foam Rubber: ASTM D3453, Grade BD, Type 2.

H. Vinyl Covering: ASTM D3690, Vinyl coated fabric, Class A.

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: As recommended by manufacturer for products to be joined.

2.3 FINISH

A. In accordance with NAAMM AMP 500 series.

B. AA-M32,Mechanical finish, medium satin.

1. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.
2. Stainless Steel: NAAMM AMP 503, finish number 4.
3. Ferrous Metal:

a. Shop Prime: Clean, pretreat and apply one coat of primer and bake.
b. Finish: Over primer apply two coats of alkyd or phenolic resin enamel, and bake.

4. Nylon Coated Steel: Nylon coating powder formulated for a fluidized bonding process to steel to provide a hard smooth, medium gloss finish, not less than 0.3 mm (0.012-inch) thick, rated as self-extinguishing when tested in accordance with ASTM D635.

2.4 FABRICATION - GENERAL

A. 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. Isolate aluminum from dissimilar metals and from contact with building materials as required to prevent electrolysis and corrosion.
G. Hot-dip galvanized steel, except stainless steel, anchors and fastening devices.
H. Shop assemble accessories and package with all components, anchors, fittings, fasteners and keys.
I. Key items alike.
J. Provide templates and rough-in measurements as required.
K. Round and deburr edges of sheets to remove sharp edges.

2.5 PRODUCTS (GENERAL)

A. Provided product shall be compatible with Owner's resupply product, where applicable.
B. Provided product shall include the listed characteristics, shall be fabricated of the material and gauge indicated, and shall have the same finish as specified.

2.6 PAPER TOWEL DISPENSERS (PTD-1)

A. Surface mounted, battery operated, automated touchless, high capacity type.
B. Dispenses universal, non perforated paper towel rolls up to 8 inch wide, 8 inch diameter and up to 800 ft. long.

C. Fabricate of type 304, 20-gauge stainless steel with all welded construction and satin finish, concealed tumbler lock, secured to cabinet with a full-length stainless steel piano hinge.

D. Paper length adjustable between 9 inch and 15 inch.

2.7 COMBINATION PAPER TOWEL DISPENSER AND DISPOSAL UNITS (CTW-1)

A. Semi-recessed type.

B. Dispensing capacity for 350 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 7.6 liter (2 gallon) capacity, fabricated of 0.45 mm (0.018-inch) thick stainless steel.

2.8 TOILET TISSUE DISPENSERS (TTD-1, TTD-2)

A. Twin jumbo roll surface mounted type.

B. Fabricate cabinet of type 304, 1.0 mm (20 gauge) stainless steel with satin finish.

C. Fabricate door of type 304, 1.2 mm (18 gauge) stainless steel with satin finish. Drawn, one-piece seamless construction. Wide viewing slot to reveal toilet tissue supply inside cabinet.

C. Mount on continuous concealed backplate.

D. Tumbler lock.

E. Dispensing mechanism: high-impact ABS which shall accommodate two toilet tissue rolls up to 255 mm (10 inch) diameter with 75 mm (3 inch) diameter core, and be equipped with a sliding access panel that exposes one roll at a time.

2.9 GRAB BARS (GB-18, GB-36, GB-36V, GB-42, GB-60)

A. Fed. Spec WW-P-541/8B, Type IV, bars, surface mounted, Class 2, grab bars and ASTM F446.

B. Fabricate of type 304 stainless steel with satin finish. Grab bar shall have 1.2 mm (18 gauge) wall thickness and 1-1/2 inch outside diameter.

C. Concealed mounting flanges shall be 3 mm (1/8 inch) thick stainless steel plate 50 x 80 mm (2 inch x 3-1/8 inch) and equipped with two screw holes for attachment to wall.

D. Lengths:

1. GB-18: 18 inch
2. GB-36: 36 inch

3. GB-36V: swing up type
4. GB-42: 42 inch
5. GB-60: 60 inch

E. Flange covers for concealed mounting:
1. 0.8 mm (22 gauge) 85 mm (3-1/4 inch) diameter by 13 mm (1/2 inch) deep, and shall snap over mounting flange to conceal mounting screws, 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. Grab bar shall comply with accessible design (including ADAAG) for structural strength.

2.10 SHOWER CURTAIN RODS (SCR-1)

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 ROBE HOOKS (RH-1)

A. Surface mounted double robe hook shall be type 304 stainless steel with satin finish. Flange and support arm shall be 0.8 mm (22 gauge) and equipped with concealed 1.2 mm (18 gauge) mounting bracket that is secured to a concealed 1.0 mm (19 gauge) wall plate with a stainless steel setscrew.

B. Cap shall be 2.0 mm (14 gauge) welded to the support arm.

2.12 TOWEL BARS (TB-1)

A. Type 304 stainless steel with satin finish, 1 inch outside diameter, ends welded to concealed mounting flanges.

B. Flanges: type 304, 1/8 inch thick stainless steel plate, with holes for attachment to wall.

C. Snap flange covers of type 304, 22-gauge drawn stainless steel to conceal mounting screws.

D. Length: 18 inch.

2.13 METAL FRAMED MIRRORS (FM-1)

A. Fed. Spec. A-A-3002 metal frame; stainless steel, type 304.

B. Mirror Glass:

1. Minimum 6 mm (1/4 inch) thick, float glass.
2. Set mirror in a protective vinyl glazing tape.
3. Back shall be protected by full-size, shock-absorbing, water-resistant, nonabrasive, 5 mm (3/16 inch) thick polyethylene padding
3. Warranty 15 years against silver spoilage.

C. Frame:

1. One-piece, 0.9 mm (0.0359 inch) thick stainless steel, roll formed channel or angle shaped section with face of frame 19 mm (3/4 inch) wide satin finish. Square corners to be heliarc welded, ground and polished smooth. Bevel front of frame to hold frame tightly to mirror.
2. Shelf for Mirrors: None.

D. Back Plate:

1. Fabricate backplate for concealed wall hanging of galvanized 0.9 mm (0.036 inch) thick sheet steel, die cut to fit face of mirror frame, and equipped with integral horizontal hanging brackets near the top and bottom of the mirror for hanging the mirror and to prevent the mirror from pulling away from the wall. Locking device secures mirror to concealed wall hanger. 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.

F. Size:

1. FM-1: 18 inch x 36 inch.

2.14 SOAP DISPENSER (SD-1)

A. This item will be furnished and installed by Owner.

2.15 SOAP DISHES (SDH-1)

A. Fed. Spec. WW-P-541/8B, Type VI, Holder.

B. Class 1, Surface Mounted:

1. One piece with provisions for exposed fasteners.

2. Fabricate from chromium plated brass approximately 115 by 95 mm (4 1/2 by 3-3/4 inches) overall size with drainage openings at bottom.

2.16 MOP RACKS (MR-1)

A. Minimum 915mm (36 inches) long with three 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.

2.17 STAINLESS STEEL SHELVES, TYPES 45. (SH-1)

A. Fabricate shelves and brackets to design shown of 1.2 mm (0.0478-inch) thick stainless steel.

B. Round and finish smooth projecting corners of shelves and edge corners of brackets. Drill brackets for 6 mm (1/4-inch) anchor bolts.

C. Screw or weld brackets to shelves.

2.18 STAINLESS STEEL SHELVES AT WHEELCHAIR LAVATORY (SH-1)

A. Side wall mounted:

1. Fabricate to size and shape shown of 1.2 mm (0.0478 inch) thick sheet.
2. Turn up edges and weld corners closed.
3. Fabricate brackets and weld to shelf. Drill brackets for 6 mm (1/4 inch) anchor bolts.

B. Back wall mounted:

1. Fabricate to size and shape shown of plate and tube.
2. Turn up edges and weld corners of shelf.
3. Weld tube to back plate and shelf, weld back plate to shelf, filler plate to tube, and corners of shelf with continuous welds.
4. Drill back plate for 6 mm (1/4 inch) anchor bolts.

2.19 HIGH-SPEED HAND DRYER (HHD-1)

A. Surface mounted, electric type.

B. All internal parts to be coated according to Underwriters' Laboratories, Inc. or similar testing agency. Entire mechanism to internally grounded.

C. Unit shall be direct wired.

D. Fabricate of one piece, type 304 22-guage stainless steel with satin finish and 16-guage stainless steel mounting plate.

E. Activation by automatic infrared optical sensor.

F. Motor and Blower: 5/8 HP, 20,000 RPM with an air flow rate of 18,000 to 20,000 feet per minute. Power source as indicated on Drawings.

G. Heater: 900 watts minimum, mounted inside blower housing; vandal resistant; automatic resetting thermostat; air temperature of 130°F minimum measured at average hand position of 4 inches below air outlet.

H. Provide warranty for a period of not less than five years.

2.20 SANITARY NAPKIN DISPOSAL (SND-1)

A. Surface mounted type, type 304, 0.8 mm (22 gauge) stainless steel with all welded construction.

B. Exposed surfaces shall have satin finish.

C. Cover shall be drawn, one piece, seamless construction and secured to container with a full-length stainless steel piano-hinge.

D. Container shall have integral finger depression for opening cover.

2.21 TOILET SEAT COVER DISPENSER (TSC-1)

A. Surface mounted type, Type 304, 0.8 mm (22 gauge) stainless steel all welded construction with beveled opening.

B. Exposed surfaces shall have satin finish.

C. Concealed opening in bottom for filling. Dispensing capacity for 250 paper toilet seat covers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before starting work notify COR in writing of any conflicts detrimental to installation or operation of units.

B. Verify with the COR 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.

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.

I. Install grab bars to withstand a downward load of at least 250 lbf (1112N), when tested according to ASTM F 446.

3.3 SCHEDULE OF ACCESSORIES

A. See Drawings.

3.4 CLEANING

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

This section covers recessed fire extinguisher cabinets.

1.2 RELATED WORK

A. Field 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. Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.

1.4 APPLICATION PUBLICATIONS

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

B. American Society of Testing and Materials (ASTM):

D4802-10.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINET

Recessed type with flat trim of size and design shown.

2.2 FABRICATION

A. Form body of cabinet from 0.9 mm (0.0359 inch) thick sheet steel.

B. Fabricate door and trim from 1.2 mm (0.0478 inch) thick sheet steel with all face joints fully welded and ground smooth.

1. Glaze doors with 6 mm (1/4 inch) thick ASTM D4802, clear acrylic sheet, Category B-1, Finish 1.
2. Design doors to open 180 degrees.
3. Provide continuous hinge, pull handle, and adjustable roller catch.

2.3 FINISH

A. Finish interior of cabinet body with baked-on semi-gloss white enamel.

B. Finish door, frame with manufacturer's standard baked-on prime coat suitable for field painting.

PART 3 - EXECUTION

A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.

B. Install cabinet so that bottom of cabinet is 914 mm (36 inches) above finished floor.

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SECTION 11 73 00
CEILING MOUNTED PATIENT LIFT SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

Ceiling Mounted Patient Lift Systems for the transfer of physically challenged patients are specified in this section.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General Electrical Requirements and items, which are common to sections of Division 26.

1.3 QUALITY ASSURANCE

Certification for compliance is required for Ceiling Mounted Patient Lift Systems. Certifications shall be provided by an independent third party who will conduct testing to ensure that the ceiling lift and charging system are safe and in compliance with ISO 10535 & UL 60601-1

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Certificates of Compliance

C. Manufacturer's Literature and Data:

1. Lifting Capacity
2. Lifting Speed
3. Horizontal Displacement Speeds
4. Horizontal Axis Motor
5. Vertical Axis Motor
6. Emergency Brake
7. Emergency Lowering Device
8. Emergency Stopping Device
9. Electronic Soft-Start and Soft-Stop Motor Control
10. Current Limiter for Circuit Protection
11. Low Battery Disconnect System
12. Strap Length
13. All equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or piping so that the proposed installation can be properly reviewed.

D. Individual Room layouts showing location of lift system installation shall be approved before proceeding with installation of lifts.

1.5 APPLICABLE PUBLICATIONS

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

B. International Organization for Standardization (IOS):
10535-06.....Hoist for the Transfer of Disabled Persons-Requirements and Test Methods

C. Underwriters Laboratories (UL):
60601-1(2003).....Medical Electrical Equipment: General Requirements for Safety
94-2013.....UL Standards for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances-Fifth Edition

D. International Electromagnetic Commission (IEC):
801-2(1991).....Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment-Part 2: Electromagnetic Discharge Requirements

PART 2 - PRODUCTS

2.1 CEILING TRACK SYSTEM

The Ceiling Track shall be made from high strength extruded aluminum T66081-T5 at a thickness of 3/16” (4.8mm). Provide anchor supports at a minimum 3 per linear foot at ceiling substrate. The ceiling track shall be finished with baked enamel paint.

2.2 LIFT UNIT

A. The Lift Unit shall be constructed of a steel frame system (2205lbs / 1000kg tested) driven by a gear reduced high torque motor

B. The Lift system shall have the following features.
1. Lifting capacity: 600 lbs
2. Electronic soft-start and soft-stop motor control
3. Emergency lowering device
4. Emergency stopping device
5. Current limiter for circuit protection in case of overload.
6. Safety device that stops the motor to lift when batteries are low.
7. Lifting speed: 2.3in/s (6 cm/s)in full capacity
8. Horizontal displacement speed: 5.9in/s (150mm/s)
9. Horizontal axis motor: 24VDC at 62 watts and vertical axis motor at 110 watts

10. Emergency brake (in case of mechanical failure)
11. Strap length up to 90in (2.3m) tested for 2998lbs (1360kg)
12. Cab: VO plastic–fire retardant, UL 94

2.3 MOTORS

A. Vertical Movement-DC Motor
   1. Type: Class A, fully enclosed, permanent magnet.
   2. Rating: 24Vdc, 1.1A, 110W, 4000RPM, 0.3N-m.
   3. Mounting: Secured to chassis.

B. Horizontal Movement-DC Motor
   1. Type: Fully enclosed, permanent magnet, integral reducer.
   2. Rating: 24Vdc, 1.8A, 62W, 260RPM, 1.0N-m.
   3. Mounting: Secured to chassis.

2.4 BATTERIES

A. The life cycle (number of charging cycles) for batteries shall be in compliance with IEC 801-2.

B. Provide rechargeable batteries with up to 120 transfers with a load of 200lbs (74kg) and up to 70 transfers with its maximum load of 440lbs (200kg).

2.5 CHARGER

A. Charger Input: 100-240 Vac, 50/60 Hz.

B. Charger Output: 27 Vdc, 1 A max.

C. Supplemental to the charger provide a clip on charging station with indicator lights.

2.6 STRAPS AND SLING

A. The straps shall be made of threaded nylon. The straps shall ensure the patient’s safety by preventing the patient from falling out of the sling.

B. The sling shall be made from a polyester/nylon net material that is pliable, breathable and easy to use. The sling shall cradle the body of the patient.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install ceiling mounted patient lift system as per manufacturer's instruction and under the supervision of manufacturer's qualified representative and as shown on drawings.

B. If the distance in between the suspended ceiling and anchors is more than 18” consult with manufacturer to determine if lateral braces will be required.

3.2 INSTRUCTION AND PERSONNEL TRAINING

Training shall be provided for the required personnel to educate them on proper operation and maintenance for the lift system equipment.

3.3 TEST

Conduct performance test, in the presence of the Contracting officer representative and a manufacturer's field representative, to show that the patient lift system equipment and control devices operate properly and in accordance with design and specification requirements.

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SECTION 12 24 00
WINDOW SHADES

PART 1 - GENERAL

1.1 DESCRIPTION

Cloth shades, vertical blinds and venetian blinds are specified in this section. Window shades shall be furnished complete, including brackets, fittings and hardware.

1.3 QUALITY CONTROL

Manufacturer's Qualification: Venetian blind and vertical blind manufacturer shall provide evidence that the manufacture of blinds are a major product, and that the blinds have performed satisfactorily on similar installations.

1.4 SUBMITTALS

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

B. Samples:

1. Shade cloth, each type, 600 mm (24 inch) square, including cord and ring, showing color, finish and texture.
2. Vertical blind slats, 300 mm (12 inches) long, including chain and supporting channels, showing color and finish.
3. Venetian blind slats, 300 mm (12 inches) long, including cord and tape, showing color and finish.

C. Manufacturer's literature and data; showing details of construction and hardware for:

Cloth and window shades
Vertical blinds
Venetian blinds

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. Federal Specifications (Fed. Spec.):

AA-V-00200B.....Venetian Blinds, Shade, Roller, Window, Roller, Slat, Cord, and Accessories

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

A167-99(R2009).....Stainless and heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

B221/B221M-08.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

D635-10.....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

D1784-08.....Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

PART 2 - PRODUCTS

2.1 MATERIALS

A. Shade Cloth: opaque.

B. Staples (For Cloth Window Shades): Nonferrous metal or zinc-coated steel.

C. Stainless Steel: ASTM A167

D. Cords for Venetian Blinds: No. 4 braided nylon or No. 4-1/2 braided cotton having not less than 175 pounds breaking strength.

E. Extruded Aluminum: ASTM B221/B221M.

2.2 VENETIAN BLINDS

Fed. Spec. AA-V-00200,Type I, 50 mm (two inch slat) fabricated of aluminum. Pre-production sample is not required.

2.3 VERTICAL BLIND LOUVER BLADES

Rigid polyvinyl chloride, light stable, ASTM D1784, Type I, Grade 2, not less than 0.6 mm (0.025 inch) thick, 90 mm (3-1/2 inches) wide, and with beaded edges on each side of not less than 1.2 mm (0.050 inch). Louvers shall withstand 80°C (180 degrees F) head chamber for thirty minutes without distortion; shrinkage or stretching for no more than one half of one percent as tested by ASTM D648. Louvers shall be opaque and of plain finish, and permanently flame retardant as tested by ASTM D635.

2.4 VENETIAN BLINDS AND SHADES ENCLOSED IN WINDOWS

Shades or blinds inside of windows panes shall be used at Mental Health and Behavioral Nursing Units. There shall be no cords or ropes attached and curtains shall not be used. Hardware should be flush with the walls so that it can’t be used to secure a nose. Hardware should also be tamper proof to prevent removal for use as a weapon or for self harm.

2.5 FASTENINGS

Zinc-coated or cadmium plated metal, aluminum or stainless steel fastenings of proper length and type. 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

2.6 FABRICATION

A. Fabricate venetian blinds to fit measurements of finished openings obtained at site.

B. Cloth Window Shades: Rolling type, constructed of shade cloth mounted on rollers. Shade cloth shall have plain sides, and with hem at bottom to accommodate wood slat. 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. Staple shade cloth to wood rollers to prevent wrinkling or folding, and on line parallel to axis of rollers so that shade will hang plumb. Space staples not over 90 mm (3-1/2 inches) on centers. Use of tacks is prohibited.
2. Wood slats shall be smooth, tapered, and inserted in the bottom hem of the shade cloth.
3. Eyelets shall have clear openings large enough to accommodate cords. Edges of eyelets shall not cut into cloth when set.
4. Cords shall be of sufficient length to permit shades to be drawn to bottom of opening with ends looped and held with cord rings. Attach cords to hems through metal eyelets in center of slats in bottom hems.

C. Venetian Blinds: Venetian blinds shall have 50 mm (two inch) width horizontal slats positioned within ladder tapes. Multiple blinds in openings are to be of same type and divided at mullions.

1. Head-rails shall fully enclose operating mechanism on three sides and ends.

2. Bottom rails shall be fully enclosed to prevent contact of tapes and sill at underside.
3. Finish concealed metal work of head-rails including concealed mechanism, with one shop coat of paint. Do not paint parts that have non-rusting finish, or parts where motion of friction occurs.

D. Vertical Blinds: Traversing type with rotating louvers positioned between window head and sill rails, and including hardware, brackets, anchors, fastenings and accessories.
1. Head and sill rails shall be one piece, extruded aluminum, full length with capped ends. Concealed surfaces shall be of manufacturer's standard finish. Exposed surfaces shall match finish on windows.
2. Provide carrier trucks for head and sill rails for each louver blade, with two, aluminum or steel, ball bearing wheels, mounted on acetal resin axles. Louvers shall be held fixed until reset by control. Stainless steel, full hard, flexible spacer links shall space and stabilize each truck by passing smoothly between stabilizer guides on each truck. No glides or sliders shall be allowed. Louvers shall traverse at any angle without binding.
3. Louvers shall be kept taut between head and sill rails with a minimum of one to a maximum of 1 Kg (2-1/2 pounds) of spring tension.
4. Traversing shall be split draw and shall be accomplished by an anodized aluminum, spiral lead screw extending the full length of the channel, actuating a lead nut, and controlled by a nickel plated brass or stainless steel bead chain. Blinds shall pack when traversed to not more than 11 mm (7/16-inch) per louver plus space for end caps and end spacer tubes.
5. All louvers shall overlap not less than 9 mm (3/8-inch). Louvers shall operate manually in opposite direction from normal traverse, and end louver shall be firmly fixed by a friction spacer or anti-creep pin.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cloth 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. In existing buildings, provide brackets similar to those on existing windows.
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 representative.

B. Venetian Blinds: Support blinds in level position by brackets and intermediate supports that will permit easy removal and replacement of units without damage to blind, or adjacent surfaces. Provide at least two fasteners for each bracket or other support.

1. Install blinds between jambs on window openings with steel trim. Mount brackets on trim reveal, flush with face of trim and secure with steel screws.
2. Install blinds between jambs on window openings with wood trim. Mount brackets on trim or on wood plaster-mold set against plaster or other wall finish, and secure in place with screws.
3. Mount brackets and intermediate supports of lobby blinds on face of trim members, and secure with stainless steel standard tap or thread-forming machine screws, or by cadmium-plated molley or toggle bolts. Screws and bolts shall penetrate through and lock behind steel sub-frame.
4. Where blinds abut glass partitions of Vestibules, extend head rails to trim at head of partition frame with slats sufficiently long to clear transom bars.
5. Provide one brush (for each 1 to 50 blind) of an approved type, suitable for cleaning blinds.

C. Vertical Blinds:

1. Support blinds in level position that will permit easy removal and replacement of units without damage to blind or adjacent surfaces. Provide at least one fastener for each 500 mm (20 inches) of width, with end screws maximum of 75 mm (three inches) from end.
2. Protect vertical blinds against defacements, warpage of slats, or bending of rails. Warped or damaged slats, or bent rails shall be removed from the site immediately and replaced. Scratching or other defacements shall be repaired at the Contractor's expense and as approved by the Contracting officer representative.

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SECTION 13 49 00
RADIATION PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies lead radiation shielding.

B. Construction of products and assemblies used for radiation shielding complying with applicable requirements of NCRP Reports 147 and 102.

C. This section includes the following items:

1. Lead Lined Wood Doors
2. Lead Glass
3. Lead Lined Frames
4. Lead Lined Gypsum Wallboard

1.2 RELATED WORK

A. Structural steel: Section 05 50 00, METAL FABRICATIONS.

B. Wood Veneer finish for doors: Section 08 14 00, WOOD DOORS, and Section 09 06 00, SCHEDULE FOR FINISHES.

C. Steel door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.

D. Hardware for doors: Section 08 71 00, DOOR HARDWARE.

E. Installation of Doors and Hardware: Section 08 14 00, WOOD DOORS

1.3 MANUFACTURERS QUALIFICATIONS

A. Approval by Contracting Officer is required of product or service of proposed manufacturer and suppliers, and will be based upon submission by Contractor of certification that:

1. Manufacturer regularly and presently manufactures lead radiation shielding as specified as one of its principal products.
2. Manufacturer's product submitted has been in satisfactory and efficient operation or three installations similar and equivalent to this project for three years.
3. Manufacturer submits list of installations.

1.4 TESTS

A. Lead radiation shielding will be tested at the expense of the Government after X-ray equipment is installed.

B. Any additional testing required due to correction and replacement of defective work will be done by the Government at Contractor's expense.

NOTE: Lead glass, lead lined concrete masonry units, lead lined gypsum lath, lead lined gypsum wallboard and lead lined plywood will not be tested prior to installation.

1.5 SUBMITTALS

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

B. Shop Drawings: Each lead radiation shielding item specified showing thickness of lead, details of construction and installation.

C. Samples:

1. Lead lined concrete masonry units, gypsum lath and gypsum wallboard.
2. Bottom corner section of lead lined door, 300 mm (12 inches) square showing bottom and side edge strips.

D. Manufacturers' Literature and Data: Each lead radiation shielding item specified.

1.6 WARRANTY

A. Warranty lead lined doors against defects in workmanship and materials subject to terms of "Warranty of Construction" Article in GENERAL CONDITIONS, except that warranty period shall be two years.

B. Warp or twist of lead lined flush veneered doors may not exceed 6 mm (1/4 inch) in any face dimension of door (including full diagonal), measured not less than six months after doors have been hung and finished.

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. Federal Specifications (Fed. Spec.):

QQ-L-201F(2).....Lead Sheet

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

A167-99(2009).....Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip

C1396/C1396M-04.....Gypsum Wallboard/Gypsum Lath

C90-11.....Load-Bearing Concrete Masonry Units

C1002-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases

D1187-97(R2002).....Asphalt-Base Emulsions for Use as Protective Coatings for Metal

D. United States Department of Commerce Product Standard (PS):

FED PSI 83-84.....Construction and Industrial Plywood

E. Military Specifications (Mil. Spec.):

MIL-C-36373.....Cabinet, Cassette Transfer, Wall Mounted

F. National Council on Radiation Protection and Measurements (NCRP):

Report 147.....Structural Shielding Design for Medical X-Ray Imaging Facilities (2004)

Report 102.....Medical X-Ray, Electron Beam and Gamma-Ray Protection for Energies up to 50 MeV (Equipment Design, Performance and Use), (1989)

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lead Sheet: Fed. Spec. QQ-L-201, Grade C, of thickness shown on drawings.

B. Lead Lined Gypsum Wallboard:

1. ASTM C1396, Type X, 16 mm (5/8 inch) thick.
2. Factory bond sheet lead to one side of wallboard.
3. Apply sheet lead in thicknesses shown, unpierced and in one piece.

C. Lead Lined Plywood Panels:

1. Prod. Std. PS1, Grade A-A interior type, 9 mm (3/8 inch) thick.
2. Factory bond sheet lead to one side of plywood.
3. Apply sheet lead in thicknesses shown, unpierced and in one piece.
4. Make each panel in one piece and of width to fully sustain its own weight without requiring intermediate nailing between joints.

D. Stainless Steel: ASTM A167.

E. Lead Glass: Clear, X-ray proof, of sufficient thickness to provide X-ray protection equivalent to that provided by partition or door in which glass occurs.

F. Lead Control Windows: Cast lead, rigid, single unit type without joints, with or without voice passage as shown and with lead stop beads and lead glass.

G. Lead Discs: Same thickness as lead lining, diameter 25 mm (1 inch) larger than fastener.

2.2 FABRICATION

A. General: Lead lining of frames, doors and other items occurring in partitions shall provide an X-ray absorption equivalent to that of partitions in which they occur.

B. Clearance between Doors and Frames and Floors:

1. Jambs and Heads: A maximum 3 mm (1/8 inch) clearance.
2. Bottom of door to finish floor: Maximum 19 mm (3/4 inch) clearance.

C. Lead Lined Wood Doors:

1. Flush veneered construction.
2. Construct doors of two separate solid wood cores with a single sheet of lead lining through center.
3. Doors shall have filler strips, crossbanding, face veneers and hardwood edge strips, all glued together with unextended urea resin glue applied under heavy pressure.
4. Extend sheet lead lining to all door edges, providing X-ray absorption equal to partition in which door occurs.
5. Fasten wood cores together with either countersunk steel bolts through lead with bolt heads and nuts covered with poured lead, or with poured lead dowels.
6. Bolts or dowels shall be located 38 mm (1-1/2 inches) from door edges, and at not more than 200 mm (eight inches) on center in each direction over door area.
7. Finish face of dowels and lead covering of bolt heads and nuts flush with wood cores.
8. Edge strips:
   a. Same species of wood as face veneer.
   b. Minimum thickness of edge strips shall be 38 mm (1-1/2 inches) at top edge and 63 mm (2-1/2 inches) at bottom edge.
   c. Glue strips to cores before face veneer is applied.
   d. Extend vertical edge strips full height of door and bevel 3 mm (1/8 inch) for each 50 mm (two inches) of door thickness.
   e. Give top and bottom edges of doors to receive transparent finish two coats of water resistant sealer before shipment to site.
9. Crossbanding of hardwood:
   a. Not less than 2 mm (1/12 inch) thick and face veneer not less than 1 mm (1/28 inch) thick, after sanding.
   b. When straight grain stock such as Basswood, Aspen or Poplar is used for crossbanding, its thickness may be 1.6 mm (1/16 inch) in lieu of 2 mm (1/12 inch).
10. Face veneer for doors specified in Section 09 06 00, SCHEDULE FOR FINISHES to have transparent finish, shall be rotary cut premium grade, uniform light, Birch.

11. Face veneer for painted doors shall be rotary cut, good grade, mill choice close grained hardwood, except lauan is not acceptable. Use only one species of wood for face veneer.
    a. Use identical face veneer on both sides of door. Apply face veneer with grain vertical.
    b. Give doors to be painted a shop prime coat of exterior oil paint on all surfaces before shipment to site.

D. Hardware:
1. Hardware for doors is specified in Section 08 71 00, DOOR HARDWARE.
2. Stagger bolts to door pulls on plates which penetrate lead lining relative to opposite plate and recess on side of door opposite pull.
3. Provide lead plugs or discs over recessed nut ends of such bolts, unless otherwise shown.
4. Nut ends of bolts for door closures and automatic door operators shall be countersunk and covered with lead lined 16 gage stainless steel pans.
5. Provide round head screws with dull chromium plated finish to secure stainless steel pans.
6. Make recesses for lock and latch cases at mill and line with lead butted tightly to lead in door.
7. Make total thickness of sheet lead used for lining hardware, equivalent to thickness of sheet lead core of door.
8. Protection and installation of doors and hardware is specified in Section, 08 11 13 / 08 14 00 / 08 71 00, HOLLOW METAL DOORS AND FRAMES / WOOD DOORS / DOOR HARDWARE.

E. Lead Lining of Frames:
1. Line or cover steel frames, stops for doors, and corner type control windows with sheet lead.
2. Install sheet lead free of waves, lumps and wrinkles with as few joints as possible.
3. Make joints in sheet lead to obtain X-ray absorption equivalent to adjacent sheet lead. Finish joints smooth and neat.
4. Structural steel frames and metal door frames for lead lined doors are specified in Section 05 50 00, METAL FABRICATIONS and Section 08 11 13, HOLLOW METAL DOORS AND FRAMES respectively.

F. Thresholds:

1. Neatly fit thresholds around cover plates of floor hinges. Lead lining shall enclose box of floor hinge.
2. Provide stainless steel expansion bolt fasteners as detailed.

G. Lead Rayproof Louvers:
1. Fabricate louvers entirely of lead of thickness required to provide protection equivalent to that required in adjoining construction, and fastened with exposed screws.
2. Fastenings for louvers in doors must not penetrate lead lining of door.

PART 3 - EXECUTION

3.1 FLOOR LEAD

A. Concrete floor slabs:
1. Thoroughly cleaned and smooth, and free of defects that might cause damage to lead.
2. Floor slab shall be cured a minimum of 90 days.
3. Before installation of lead, coat concrete surfaces with two coats of asphalt-base emulsion (ASTM D1187).
4. Lap sheets of floor lead not less than 38 mm (1-1/2 inches).

B. After installation of sheet lead, apply two coats of Asphalt base emulsion material over the lead and protect from damage until concrete fill and floor topping in installed.

C. Lead lined concrete masonry partitions:
1. Place a continuous lead strip under partitions with a 50 mm (two inch) projection on X-ray room side.
2. Overlap sheet lead on floors on lead strips at least 38 mm (1-1/2 inches).

D. Lead lined lath or panels: Sheet lead on floors shall lap lead lining in wall a minimum of 38 mm (1-1/2 inches).

E. Where lead lined thresholds are not required, continue lead strips under partitions across door opening and extend strip 300 mm (12 inches) outside of partition and 300 mm (12 inches) beyond each jamb of door openings.

F. For existing floors:
1. Lay lead sheets with butt joints.
2. Lay lead strip 38 mm (1-1/2 inches) wide and of same thickness as floor lead centered under full length of each butt joint.

3. Lay strips in concrete fill as shown, to same clearances provided in existing floor so that top of strip will be level with existing floor.

3.5 LEAD LINED GYPSUM WALLBOARD PANELS

A. Apply lead lined gypsum wallboard to metal studs as shown.

B. Predrill or drill pilot holes for nails or screws as necessary to prevent deformation of the fastener and lead shielding and to prevent distortion of the wallboard.

C. Apply wallboard vertically with lead linings placed next to supports.

D. Install sheet lead strips behind joints not less than the thickness used for the wallboard.

1. The lead strips: 45 mm (1-3/4 inches) wide, except at corner joints, 45 mm by 45 mm (1-3/4 by 1-3/4 inch) lead angles shall be used.
2. Secure the lead strips to supports at outer edges of strips.

E. Wallboard:

1. Fastened to supports with screws and lead washers or discs at approximately 250 mm (ten inches) on centers.
2. Make provisions for connection with lead lined door frames and for cutouts for vision panels.
3. Joint treatment of lead lined gypsum board panels and fastening depressions shall be as specified for wallboard in Section 09 29 00, GYPSUM BOARD.

3.6 SUPPLEMENTAL LEAD SHIELDING

A. Line or cover penetrations of wall lead, pipe chases, columns fasteners and elsewhere where shown with sheet lead. Install sheet lead free of waves, lumps and wrinkles and with as few joints as possible. Joints in sheet lead shall provide X-ray absorption equivalent to adjacent sheet lead finished smooth and neat.

B. Where plaster finish is required over columns or other vertical surfaces covered with sheet lead, drive bolts or other fasteners securing the sheet lead to backing surface half way, and wrap an 18 gage stainless steel tie wire around fasteners. Both ends of each tie wire shall be of sufficient length so that when fastener is fully driven, fastening of metal lath may be accomplished. Locate fasteners not over 400 mm (16 inches) on centers both ways and cover heads with lead strips or discs if washers are not used.

C. Provide sufficient lead shielding for spaces around outlet boxes, junction boxes, film illuminators, and pipes, to obtain a net radiation protection at these spaces equaling net radiation protection specified for wall or partition in which they occur.

3.7 SIGNS: FURNISH SIGNS AS FOLLOWS:

A One for each Fluoroscopic Room Insulated with sheet lead and lettered as follows:

SURFACES OF THIS ROOM HAVE BEEN INSULATED WITH SHEET LEAD OF THE FOLLOWING THICKNESS TO A HEIGHT OF 2100 mm (7 FEET) ABOVE FLOOR SLAB:

	LEAD THICKNESS	TOTAL LEAD EQUIVALENT PROTECTION
DOORS AND FRAMES - -	____3___ mm	_____3___ mm
PARTITIONS - - - - - - -	____3___ mm	_____3___ mm
FLOORS - - - - - - - - -	____3__ mm	_____3___ mm

E. Signs:

1. Heavy white paper or cardboard.
2. Height of lettering and number not less than 3 mm (1/8 inch).
3. Fill in blank spaces on signs with mm thickness of lead as installed and total mm thickness of lead equivalent (determined by VA Physicist) and height of such insulation where required.
4. Mount in stainless steel or extruded aluminum frames (with acrylic plastic, 3 mm (1/8 inch) thick over sign) and fasten with suitable screws, one to each corner of each frame.
5. Provide manufacturer's standard stainless steel frame, to hold card size 100 mm by 150 mm (four by six inches).

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